```
Set      Items   Description
S1        1548   NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-
              NE? OR BSPLINE?
S2          67   S1 (S) (VECTOR? OR DERIVATIVE?)
S3          22   S2 AND BEZIER?
S4          14   S3 (S) (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-
              ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5          10   S4 (S) (PIPE? OR RENDER? OR MODEL? OR REPRESENTAT? OR CAD)
S6          12   RD S4 (unique items)
S7          11   S6 NOT PY>1997
S8          10   S7 NOT PD>970425
File  88:IAC BUSINESS A.R.T.S. 1976-1999/Mar 03
         (c) 1999 Information Access Co.
File  15:ABI/INFORM(R) 1971-1999/Mar 02
         (c) 1999 UMI
File  16:IAC PROMT(R) 1972-1999/Mar 03
         (c) 1999 Information Access Co.
File   9:Business & Industry(R) Jul 1994-1999/Mar 03
         (c) 1999 Resp. DB Svcs.
File  13:BAMP 1999/Feb W3
         (c) 1999 Resp. DB Svcs.
File 734:Dayton Daily News Oct 1990- 1999/Mar 02
         (c) 1999 Dayton Daily News
File 610:Business Wire 1999-1999/Mar 03
         (c) 1999 Business Wire.
File 623:Business Week 1985-1999/Feb W3
         (c) 1999 The McGraw-Hill Companies Inc
File 647:CMP  Computer Fulltext 1988-1999/Feb W3
         (c) 1999 CMP
File  98:General Sci Abs/Full-Text 1984-1999/Jan
         (c) 1999 The HW Wilson Co.
File 148:IAC Trade & Industry Database 1976-1999/Mar 03
         (c) 1999 Info Access Co
```

8/3,K/1 (Item 1 from file: 88)
DIALOG(R)File 88:IAC BUSINESS A.R.T.S.

04189511 SUPPLIER NUMBER: 19017364 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Finding feasible tool-approach directions for sculptured surface manufacture.
Kim, Kwangsoo; Jeong, Jaehun
IIE Transactions, v28, n10, p829(8)
Oct, 1996
ISSN: 0740-817X LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3362 LINE COUNT: 00265

... the set of patches approximates the given sculptured surface to within the specified tolerance.
A **Bezier** patch is easily subdivided into four subpatches as discussed below. The subdivision procedure will be...

...than cubic cases as well. Let us first consider the problem of subdividing a cubic **Bezier** **curve** r(t) at t = 1/2. Let (r.sub.a)(t) and (r.sub.b...

...follows:
(1) subdivided each row i of {(V.sub.ij)} as if it were a **Bezier** **curve** , and
(2) subdivided each column j of the subdivided control vertices.
The subdivision process is...nodes of the quadtrees.
The same subdivision strategy is directly applicable to subdividing B-spline **surfaces** as proposed by Peng (1984). However, with the subdivision algorithm for **Bezier** patches on hand, a more practical strategy would be to convert each B-spline **surface** into a composite **Bezier** patch. The conversion process is easily carried out by using the Boehm's knot insertion...single specification. The format is general enough to handle rational, non-uniform, periodic and open **B -spline** **surfaces** . Rational **Bezier** **surfaces** are specified by using uniform open knot **vectors** of the form (k zeros k ones) with appropriate weighting factors.
Fig. 9 shows a...B-spline curves. Computer Aided Design, 12(4), 199-201.
Boehm, W. (1981) Generating the **Bezier** points of B-spline **curves** and **surfaces** . Computer Aided Design, 13(6), 365-366.
Choi, B. (1991) Surface Modeling for CAD/CAM...

...ASME Symposium on Integrated and Intelligent Manufacturing, Anaheim, CA, USA.
Kim, D. (1990) Cones on **Bezier** **curves** and **surfaces** . Ph.D. dissertation, Department of Industrial and Operations Engineering, University of Michigan, USA.
Kim, K...

...691-699.
Tseng, Y. and Joshi, S. (1991) Determining feasible tool approach directions for machining **Bezier** **curves** and **surfaces** . Computer Aided Design, 23(5), 367-379.
Biographies
Kwangsoo Kim is an Associate Professor in...

8/3,K/2 (Item 2 from file: 88)
DIALOG(R)File 88:IAC BUSINESS A.R.T.S.

02890999 SUPPLIER NUMBER: 12735841
From Conics to NURBS: a tutorial and survey. (Technical)
Farin, Gerald
IEEE Computer Graphics and Applications, v12, n5, p78(9)
Sept, 1992
DOCUMENT TYPE: Technical ISSN: 0272-1716 LANGUAGE: English
RECORD TYPE: Abstract

ABSTRACT: **Nonuniform rational B -splines** (**NURBS**) are invariably considered the most promising **curve** or **surface** form. Detailed is the main geometric features of the **curve** . Most of them are already exhibited in a special case of **NURBS** , called conics. Areas discussed include weight point, reparameterization, **derivatives** , curvature and G (squared) continuity, and control **vectors** . Rational **Bezier** **curves** are also looked at, along with cubic NURB **curves** , geometric rational splines, and rational **Bezier** and **B -spline** **surfaces** . Rational **Bezier** triangles and **derivatives** of those triangles, along with spheres and quadrics are also considered.

8/3,K/3 (Item 3 from file: 88)
DIALOG(R)File 88:IAC BUSINESS A.R.T.S.

02628124 SUPPLIER NUMBER: 09831201
On NURBS: a survey. (technical)
Piegl, Les
IEEE Computer Graphics and Applications, v11, n1, p55(17)
Jan, 1991
DOCUMENT TYPE: technical ISSN: 0272-1716 LANGUAGE: English
RECORD TYPE: Abstract

ABSTRACT: Rational and **B -splines** are the two major ingredients of **NURBS** , a widely accepted standard tool for geometry representation and design. Reasons for this acceptance are...

...offer a common mathematical form to represent and design standard analytic shapes and free-form **curves** and **surfaces** ; flexibility to design a wide variety of shapes; fast and computationally stable evaluation; clear geometric...

...invariance under scaling, rotation, translation, shear, and parallel and perspective projection; genuine generalizations of nonrational **B -spline** forms as well as rational and nonrational **Bezier** **curves** and **surfaces** . Shapes can be modified several ways with the definition of **NURBS** : by repositioning control points, changing the weights, modifying the knot **vector** , or moving data points and reinterpolating.

8/3,K/4 (Item 1 from file: 15)
DIALOG(R)File 15:ABI/INFORM(R)

01314268 99-63664
On deciding 3D part disassemblability and surface machinability
Ha, Jong-Sung; Choi, Seung-Hak; Shin, Sung-Yong; Chwa, Kyung-Yong; et al
IIE Transactions v28n10 PP: 848-854 Oct 1996
ISSN: 0740-817X JRNL CODE: AIE
WORD COUNT: 2595

...TEXT: Tseng and Joshi (1991) developed an algorithm to determine the feasible directions for machining 2D **Bezier** **curves** and **surfaces** . Its extension to 3D **surfaces** was discussed but the algorithms remained elusive. Chen and Woo (1992) gave solutions to solving the machinability problem of 3D **surfaces** by using gaussian mapping and central projection.

In this paper we present efficient algorithms for...of ACM, 31(1), 114127. Nasri, A.H. (1987) Polyhedral subdivision methods for free-form **surfaces** . ACM Transactions on Graphics, 6(1), 29 73. Nnaji, B.O., Jagtap, P.B., Sadraoh, J.B. and Yeh, S.C. (1992) Automated precedence and spanning **vector** generation for assembly planning. Journal of Design and Manufacturing, 2(4), 211-224. O'Rourke...

... Image Processing, 19, 384-391. Piegl, L.A and Richard, A.M. (1995) Tessellating trimmed **NURBS**

surfaces. Computer Aided Design, 27(1), 16-26. Preparata, F.P. and Hong, S.J...

... 5563. Tseng, Y.J. and Joshi, S. (1991) Determining feasible tool-approach directions for machining **Bezier** **curves** and **surfaces** . ComputerAided Design, 23(5), 367-379.

Vickers, G.W. and Quan, K.W. (1989) Ball...

8/3,K/5 (Item 2 from file: 15)
DIALOG(R)File 15:ABI/INFORM(R)

01307892 99-57288
Matra's development framework
Halpern, Marc
Computer-aided Engineering v15n10 PP: 74 Oct 1996
ISSN: 0733-3536 JRNL CODE: CAE
WORD COUNT: 665

...TEXT: In modeling, Cas.cade supports a comprehensive geometry object creation resource-from primitive coordinates and **vectors** , to lines, Conics, and both **Bezier** and **Nurbs** freeform **curves** . **Surface** geometry provides elementary **surfaces** up through free-form **Bezier** and **Nurbs** . All forms are STEP-compliant. Solids geometry combines geometric object classes through Topology structures into...

8/3,K/6 (Item 3 from file: 15)
DIALOG(R)File 15:ABI/INFORM(R)

01049976 96-99369
Surface modeling - Renewed attention
Brown, Donald H
Computer-aided Engineering v14n6 PP: 60 Jun 1995
ISSN: 0733-3536 JRNL CODE: CAE
WORD COUNT: 742

...TEXT: sweeps and lofts combined with diagnostic aids can expedite surface creation.

Consequently, development in 3D **surface** modeling continues. The vendors are employing increasingly powerful tools. Today, nonuniform rational B-spline (Nurbs) technology reflects the state of the art in surfacing, replacing **Bezier** surfacing, B-splines, and nonuniform B-splines (Nubs). In addition, the industrial demand for integrated...

... filleting. However, their capabilities vary widely in editing flexibility, surfacing functions, and the quality of **surface** analysis tools to dynamically review and assess quantities such as "porcupine normal **vectors** " and curvature. They all provide a means of fitting "scan-type" data. No general-purpose CAD vendor has yet delivered the full suite of **surface** analysis tools that can be used dynamically and interactively during **surface** creation. No implementation fully exploits the ability to perform localized edits with **Nurbs** .

PTC and SDRC lead in allowing for history capture and parametric surface definition. PTC surfacing...

8/3,K/7 (Item 4 from file: 15)
DIALOG(R)File 15:ABI/INFORM(R)

00807267 94-56659

Prototype integrated robotic painting system: Software and hardware development
Suh, Suk-Hwan; Lee, Jung-Jae; Choi, Yong-Jong; Lee, Sung-Kwon
Journal of Manufacturing Systems v12n6 PP: 463-473 1993
ISSN: 0278-6125 JRNL CODE: JMY
WORD COUNT: 4820

...TEXT: on the availability of the physical model.

DESIGN VIA INTERACTIVE GEOMETRIC MODELING

In CAGD, sculptured **surfaces** are modeled by many schemes: Ferguson, **Bezier** , **B -spline** [and its **derivatives** , such as NUB (nonuniform **B - spline**) and NURB (**nonuniform rational B -spline**)], and compound forms. For an interactive design, **B -spline** based schemes are powerful due to their localized propagation and shape controllability 9,10 Including ...

...system. In this case, ICAD module can be used for a partial modification of the **surface** designed in the professional system.
In the developed ICAD module, a NUB modeler (NUBS) and...

8/3,K/8 (Item 1 from file: 148)
DIALOG(R)File 148:IAC Trade & Industry Database

06791456 SUPPLIER NUMBER: 14636021 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Evaluating 3D on the high end: a hands-on comparison of state-of-the-art software for 3D graphics and animation. (Software Review) (three-dimensional; ElectroGIG USA Inc.'s GIG 3DGO, Vertigo Technology Inc.'s Vertigo 9.5 and Wavefront Technologies Inc.'s Advanced Visualizer 3.0.1) (Evaluation)
Forcade, Tim
Computer Graphics World, v16, n11, p57(8)
Nov, 1993
DOCUMENT TYPE: Evaluation ISSN: 0271-4159 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4262 LINE COUNT: 00357

... solids modeling, materials creation and editing, raytracing, and keyframe animation. Additional modules are available for **NURBS** modeling, (Nurbsmodeler), iso-**surface** modeling (Sculptor), **vector** -field animation (Flowmotion), image-map creation (Mapfactory), textural raytracing (Raysketcher); there are also various conversion...along with a column of menu buttons specific to the process. Support for cardinal and **Bezier curves** , circles and arcs, and point editing is provided. Additional Model functions include Boolean equations as well as numerous deformation, such as **skew** , **twist** , taper, and bend.
A distinguishing characteristic of Model (and Preview as well) is it "a...

8/3,K/9 (Item 2 from file: 148)
DIALOG(R)File 148:IAC Trade & Industry Database

06503617 SUPPLIER NUMBER: 14175583 (USE FORMAT 7 OR 9 FOR FULL TEXT)
From "primitive" to finished version, Macintosh software eases 3-D modeling. (three-dimensional software)
Cillo, Joe
Computer Pictures, v11, n2, p34(3)
March-April, 1993
ISSN: 0883-5683 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2499 LINE COUNT: 00204

... use scanned images. List: $1,995.
formyZ

AUTO.DES.SYS

A powerful general purpose solid/**surface** modeler with extensive 2- and 3-D form manipulating and sculpting capabilities. It features a highly interactive graphic interface, dynamically generated 3-D solids and **surface** objects integrated in a single modeling environment. Included are: virtually unlimited undo/redo, simultaneously available prepick and postpick modes, **derivative** objects, Boolean operations, terrain models, **NURBS** and **curved** **surfaces** , graphically and dynamically executed 2- and 3-D geometric transformations, 3-D form editing and...
...sources with variable color and brightness; shadows cast according to sun position; 24-bit rendering; **Bezier** or **curved** **surfaces** ; and quick contour terrain modeling. List: $895.

Presenter Professional

VISUAL INFORMATION DEVELOPMENT INC.

This versatile...

8/3,K/10 (Item 3 from file: 148)

DIALOG(R)File 148:IAC Trade & Industry Database

03010530 SUPPLIER NUMBER: 06066248

The conic curve: cubic splines can't match a method based on a more natural form.

Villalobos, Luis
Computer Graphics World, v10, n5, p91(3)
May, 1987
ISSN: 0271-4159 LANGUAGE: ENGLISH RECORD TYPE: ABSTRACT

ABSTRACT: The C, or conographic, **curve** is offered as a more accurate and efficient alternative especially than the cubic spline especially for type fonts. It overcomes the inherent limitations of the **B -spline** and **Bezier** forms by packing more constraints into less data. **Vector** approximations depend on the resolution of the device, so when a **vector** approximation is scaled up n times, then n times more resolution is needed. The following criteria would have to be met to surpass cubic splines and **vector** approximations: computational practicality and efficiency; universality; and mathematical robustness. Starting with some form of conic ...

...by area) proved a successful approach. Using this basic two-point, two-tangent algorithm, a **curve** -fitting technique for smoothing data with C **curves** was developed. Despite certain limitations, the C **curve** has resulted in the introduction of analog, digital, and hybrid C-**curve** hardware generators.

Set	Items	Description
S1	122	NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-NE? OR BSPLINE?
S2	34	S1 (S) (VECTOR? OR DERIVATIVE?)
S3	6	S2 AND BEZIER?
S4	6	S3 (S) (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5	1	S4 (S) (PIPE? OR RENDER? OR MODEL? OR REPRESENTAT? OR CAD)
S6	61638	IC=G06F-011?
S7	50948	MC=T01-J10?
S8	15	S1 AND BEZIER?
S9	112415	(S6 OR S7)
S10	32	S1 AND S9
S11	13	S10 AND (VECTOR? OR DERIV? OR TANGENT? OR BEZIER?)
S12	18	S10 AND (RENDER? OR MODEL? OR REPRODUC? OR IMAG?)
S13	36	S3 OR S8 OR S11 OR S12
S14	35	S13 NOT AD>970425
S15	35	IDPAT (sorted in duplicate/non-duplicate order)
S16	24	S15 AND IC=G06F?

File 344:Chinese Patents ABS Apr 1985-1999/Jan

File 347:JAPIO Oct 1976-1998/Oct.(UPDATED 990204)

File 351:DERWENT WPI 1963-1998/UD=9909;UP=9909;UM=9909

16/5/1 (Item 1 from file: 347)
DIALOG(R)File 347:JAPIO

05915712
APPROXIMATING METHOD FOR FREE-FORM SURFACE

PUB. NO.: 10-198812 [JP 10198812 A]
PUBLISHED: July 31, 1998 (19980731)
INVENTOR(s): TOKUYAMA YOSHIMASA
APPLICANT(s): RICOH CO LTD [000674] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 09-001665 [JP 971665]
FILED: January 08, 1997 (19970108)
INTL CLASS: [6] G06T-011/20; G06T-017/30; **G06F-017/50** ; G06T-015/00
JAPIO CLASS: 45.9 (INFORMATION PROCESSING -- Other); 45.4 (INFORMATION PROCESSING -- Computer Applications)
JAPIO KEYWORD: R060 (MACHINERY -- Automatic Design)

ABSTRACT
PROBLEM TO BE SOLVED: To approximate a curved surface of an optional degree to a **NURBS** curved surface without changing the curved surface boundary shape.

SOLUTION: Four boundary curves of an original curved surface are transformed into tertiary **B - spline** curves (S3) to approximate the curved surface to a **NURBS** curved surface, two facing tertiary **B -spline** curves of a knot **vector** are merged (S4) to construct meshes of an approximate curved surface (S5). Each mesh is approximated in a bi-tertiary Besizer curved surface (S6), every bi-tertiary **Bezier** curved surface is performed C1 succession (S7), approximation accuracy is evaluated, an intermediate knot in a knot **vector** is inserted (S8), or all bi-tertiary **Bezier** curved surfaces are connected to create one **NURBS** curved surface (S9). When the four boundary curves of the original curved surface are higher order curves or rational curves, they are approximated to tertiary **B -spline** curves, curved surface approximation is reformed based on the curves, and boundary curves are replaced with the four boundary curves of the original curved surface after the acquired approximation curved surface is raised in degree and rationalized (S10).

16/5/2 (Item 2 from file: 347)
DIALOG(R)File 347:JAPIO

04578731
DATA TRANSFORMING DEVICE

PUB. NO.: 06-250631 [JP 6250631 A]
PUBLISHED: September 09, 1994 (19940909)
INVENTOR(s): AOKI KAZUMA
APPLICANT(s): BROTHER IND LTD [000526] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 05-035288 [JP 9335288]
FILED: February 24, 1993 (19930224)
INTL CLASS: [5] G09G-005/24; **G06F-015/72** ; G09G-005/20
JAPIO CLASS: 44.9 (COMMUNICATION -- Other); 45.4 (INFORMATION PROCESSING -- Computer Applications)
JOURNAL: Section: P, Section No. 1839, Vol. 18, No. 645, Pg. 37, December 07, 1994 (19941207)

ABSTRACT
PURPOSE: To facilitate data transformation from data defined by a straight line and a cubic **Bezier** curve to data defined by a straight line and a quadratic **B spline** curve by a simple method relieving the burden of a CPU and to improve the efficiency for preparing an outline font.

CONSTITUTION: Transform processing is composed of curve transforming

processing (S41) transforming a cubic curve to a quadratic curve with three points, curve transforming processing (S43) transforming a cubic curve to a quadratic curve with four points, decision processing of the degree of approximation (S42, S44) deciding the degree of approximation of the transformed quadratic curve and division processing (S45) for dividing a cubic curve and the division processing and the curve transforming processing are repeatedly executed until these are judged to be all right by the decision processing for the degree of approximation

16/5/3 (Item 3 from file: 347)
DIALOG(R)File 347:JAPIO

03547781
CURVE GENERATOR

PUB. NO.: 03-210681 [JP 3210681 A]
PUBLISHED: September 13, 1991 (19910913)
INVENTOR(s): NAOI SATOSHI
APPLICANT(s): FUJITSU LTD [000522] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 02-006920 [JP 906920]
FILED: January 16, 1990 (19900116)
INTL CLASS: [5] **G06F-015/72**
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)
JOURNAL: Section: P, Section No. 1286, Vol. 15, No. 487, Pg. 110, December 10, 1991 (19911210)

ABSTRACT

PURPOSE: To reduce the capacity of a conversion coefficient table and to miniaturize a product sum arithmetic circuit by forming the conversion coefficient table for each block based on a fact that the control point of a **Bezier** function curve can be calculated from four control points of a non-uniform **B spline** function curve.

CONSTITUTION: A conversion coefficient table 23 stores the conversion coefficients corresponding to each knot vector every (4X4) blocks. A product sum circuit consists of 4 units of multipliers 24a - 24d and an adder circuit 25. A control real distributor 21 takes out four control points corresponding to the blocks of conversion coefficients read out of the table 23 among those control points of a non-uniform **B spline** function curve. Then the distributor 21 supplies those four control points to the product sum circuit to perform the operation to the blocks of the read coefficients. Thus the control point of a **Bezier** function can be calculated from four control points of the non- uniform **B spline** function curve. Therefore the undesired coefficients can be eliminated constituting the table 23 for each block. As a result, the capacity of the table 23 is reduced and the number of multipliers and adders can be decreased in the product sum circuit and the circuit is miniaturized.

16/5/4 (Item 4 from file: 347)
DIALOG(R)File 347:JAPIO

03535269
CURVE GENERATING SYSTEM

PUB. NO.: 03-198169 [JP 3198169 A]
PUBLISHED: August 29, 1991 (19910829)
INVENTOR(s): NAOI SATOSHI
APPLICANT(s): FUJITSU LTD [000522] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 01-336390 [JP 89336390]
FILED: December 27, 1989 (19891227)
INTL CLASS: [5] **G06F-015/72**
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)

JOURNAL: Section: P, Section No. 1280, Vol. 15, No. 486, Pg. 50, November 26, 1991 (19911126)

ABSTRACT

PURPOSE: To remarkably shorten the processing time by converting the control point of a non-uniform **B spline** function to the control point of **Bezier** function by using a conversion coefficient table.

CONSTITUTION: This system is provided with a data converting means consisting of a conversion table in which a conversion coefficient for converting the coordinate of a control point in a non-uniform **B spline** function to the coordinate of a control point in **Bezier** function is stored, and a sum-of-products computing element for executing the sum-of-products operation of the conversion coefficient obtained from this conversion table and input curve data. In such a state, by this data converting means, the input curve data expressed by the non-uniform **B spline** function is converted to the data of the **Bezier** function, and by using the obtained data of the **Bezier** function, a curve is generated by a **Bezier** function generator. In such a way, the conversion to the control point of the **Bezier** function of the control point of the non-uniform **B spline** function can be executed at a high speed.

16/5/5 (Item 1 from file: 351)
DIALOG(R)File 351:DERWENT WPI

012208689 **Image available**
WPI Acc No: 99-014795/199902
XRPX Acc No: N99-011566

Three-dimensional shape generation method for freely curved surface - involves calculating boundary crossing derived **function from continuity conditions of control point, weight, curved control point, curved weight and continuity in both end points of boundary curve**

Patent Assignee: RICOH KK (RICO)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 10283490	A	19981023	JP 9792538	A	19970410	G06T-011/20	199902 B

Priority Applications (No Type Date): JP 9792538 A 19970410
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
JP 10283490	A		18			

Abstract (Basic): JP 10283490 A

The method involves storing the control point and weight of a boundary curve in a memory. The curved control point and the curved weight of the boundary curve is stored in the memory.

The continuity in both end points of a boundary curve is investigated. The investigation result is stored in the memory. The boundary crossing **derived** function is calculated from the continuity conditions determined from the data stored in the memory.

ADVANTAGE - Generates continuity of freely curved surface in succession since irregular curvilinear mesh containing **NURBS** curve can be connected continuously.

Dwg.2/10

?

Title Terms: THREE-DIMENSIONAL; SHAPE; GENERATE; METHOD; FREE; CURVE; SURFACE; CALCULATE; BOUNDARY; CROSS; **DERIVATIVE** ; FUNCTION; CONTINUE; CONDITION; CONTROL; POINT; WEIGHT; CURVE; CONTROL; POINT; CURVE; WEIGHT; CONTINUE; END; POINT; BOUNDARY; CURVE
Index Terms/Additional Words: NURBS
Derwent Class: T01
International Patent Class (Main): G06T-011/20
International Patent Class (Additional): **G06F-017/12** ; G06T-015/00; G06T-017/00; G06T-017/20
File Segment: EPI

16/5/6 (Item 2 from file: 351)
DIALOG(R)File 351:DERWENT WPI

012055260 **Image available**
WPI Acc No: 98-472171/199841
XRPX Acc No: N98-368474
Approximation method of three dimensional curved surface using computer aided design - involves converting four boundary curve into teritary B spline **curve whose knot** vectors **of opposing threads are merged to obtain mesh of approximately curve shape**
Patent Assignee: RICOH KK (RICO)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 10198812	A	19980731	JP 971665	A	19970108	G06T-011/20	199841 B

Priority Applications (No Type Date): JP 971665 A 19970108
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
JP 10198812	A		6			

Abstract (Basic): JP 10198812 A

The method involves converting a four boundary curve of the curved surface of an element to a teritary **B** **spline** curve. The knot **vectors** of the teritary **B** **spline** curve of two opposing threads are merged to form a mesh of the approximately curved surface.

Each mesh is approximated to a double teritary **Bezier** curved surface. The approximation accuracy is calculated. All double teritary **Bezier** curved surfaces are coupled and one **NURBS** curved surface is obtained.

ADVANTAGE - Provides efficient approximation of curved surface. Avoids change in original boundary shape.

Dwg.2/5

Title Terms: APPROXIMATE; METHOD; THREE; DIMENSION; CURVE; SURFACE; COMPUTER; AID; DESIGN; CONVERT; FOUR; BOUNDARY; CURVE; SPLINE; CURVE; KNOT; **VECTOR** ; OPPOSED; THREAD; MERGE; OBTAIN; MESH; APPROXIMATE; CURVE; SHAPE
Derwent Class: T01
International Patent Class (Main): G06T-011/20
International Patent Class (Additional): **G06F-017/50** ; G06T-015/00; G06T-017/30
File Segment: EPI

16/5/7 (Item 3 from file: 351)
DIALOG(R)File 351:DERWENT WPI

011352189 **Image available**
WPI Acc No: 97-330095/199730
XRPX Acc No: N97-273866
Curved surface shape control apparatus e.g. for CAD/CAM system - has crossing boundary vector **replacement part which reconfigures curved surface by changing shape of crossing boundary** vector **to same as before deformation**
Patent Assignee: TOSHIBA KK (TOKE)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 9134448	A	19970520	JP 95289876	A	19951108	G06T-015/00	199730 B

Priority Applications (No Type Date): JP 95289876 A 19951108
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
JP 9134448	A		8			

Abstract (Basic): JP 9134448 A

The curved surface shape control apparatus consists of a **NURBS** boundary Gregory patch production part (10), which produces a **NURBS** boundary Gregory patch. A movement **vector** input part (12) applies a movement **vector** to the curved surface expressed by the **NURBS** boundary Gregory patch and moves each control point.

Then a crossing boundary **vector** replacement part (14) changes the shape of the crossing boundary **vector** to a shape same as that before deformation, and reconfigures the curved surface

ADVANTAGE - Maintains shape of curved surface during compression. Maintains smoothness of continuity with adjacent curves.

Dwg.1/13

Title Terms: CURVE; SURFACE; SHAPE; CONTROL; APPARATUS; CAD; CAM; SYSTEM; CROSS; BOUNDARY; **VECTOR** ; REPLACE; PART; RECONFIGURE; CURVE; SURFACE; CHANGE; SHAPE; CROSS; BOUNDARY; **VECTOR** ; DEFORM
Derwent Class: T01; T06
International Patent Class (Main): G06T-015/00
International Patent Class (Additional): G05B-019/4097; **G06F-017/50** ; G06T-011/20; G06T-017/20
File Segment: EPI

16/5/8 (Item 4 from file: 351)
DIALOG(R)File 351:DERWENT WPI

011206560 **Image available**
WPI Acc No: 97-184484/199717
XRPX Acc No: N97-152005

B- spline **curve hierarchisation method for e.g. computer graphics, computer-aided design - by converting** B- spline **curve into multiple resolution curves with different control sorts after varying variable curve point which makes parameter density inverse of length of differential** vector

Patent Assignee: NEC CORP (NIDE)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 9044543	A	19970214	JP 95190828	A	19950726	G06F-017/50	199717 B

Priority Applications (No Type Date): JP 95190828 A 19950726
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
JP 9044543	A		7			

Abstract (Basic): JP 9044543 A

The method involves changing the point on the curve designated by a variable so that a parameter density will be obtained by defining the magnitude of the curve. The parameter which has a direct correlation with the variable is the inverse of the length of the differential **vector** .

A multiple resolution curvilinear forming unit (102) converts the **B -spline** curve into a multiple resolution curve with different control sorts.

ADVANTAGE - Enables curve shape not to vary w.r.t. curvature resolution change in **B -spline** curve.

Dwg.1/7

Title Terms: CURVE; METHOD; COMPUTER; GRAPHIC; DESIGN; CONVERT; CURVE; MULTIPLE; RESOLUTION; CURVE; CONTROL; SORT; AFTER; VARY; VARIABLE; CURVE; POINT; PARAMETER; DENSITY; INVERSE; LENGTH; DIFFERENTIAL; **VECTOR**
Index Terms/Additional Words: CG; CAD
Derwent Class: T01
International Patent Class (Main): **G06F-017/50**
International Patent Class (Additional): G06T-011/20
File Segment: EPI

16/5/9 (Item 5 from file: 351)

DIALOG(R)File 351:DERWENT WPI

010724553 **Image available**
WPI Acc No: 96-221508/199622
XRPX Acc No: N96-185945

Computer aid design method for creating surface model **- generating surface by interpolating grid of selected points, while additional input may include boundary and internal character curves and specific bounds on intrinsic surface properties**

Patent Assignee: UNIV IOWA STATE RES FOUND INC (IOWA)
Inventor: OLIVER J H
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
US 5510995	A	19960423	US 93106483	A	19930813	G06F-019/00	199622 B

Priority Applications (No Type Date): US 93106483 A 19930813
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
US 5510995	A		26			

Abstract (Basic): US 5510995 A

The method involves using one or more electromechanical input devices, entering design instructions and specifications into the CAD system to specify a surface under design. The CAD system displays on the graphical display device a three-dimensional representation of the surface in response to the design instructions and specifications.

The surface stored in the storage device is in the form of surface data specifying a **non -uniform rational B -spline** (**NURBS**) including a number of parameters. The surface data initially is a current state of the data. Using the CAD system, it requires then automatically reconfiguring the surface to avoid an obstacle in a common frame of reference with the surface.

USE/ADVANTAGE - In surface synthesising based on functional design constrains. Allows designer to control shape of surface by imposing boundary conditions and external loads.

Dwg.10a/12

Title Terms: COMPUTER; AID; DESIGN; METHOD; SURFACE; **MODEL** ; GENERATE; SURFACE; INTERPOLATION; GRID; SELECT; POINT; ADD; INPUT; BOUNDARY; INTERNAL; CHARACTER; CURVE; SPECIFIC; BOUND; INTRINSIC; SURFACE; PROPERTIES
Derwent Class: T01
International Patent Class (Main): **G06F-019/00**
International Patent Class (Additional): **G06F-015/00**
File Segment: EPI

16/5/10 (Item 6 from file: 351)
DIALOG(R)File 351:DERWENT WPI

010592113 **Image available**
WPI Acc No: 96-089066/199610
XRPX Acc No: N96-074603

Binary image **scaling by piece-wise polynomial interpolation - involves re-sampling input binary** image **on fitting surface to provide interpolative data, using data as threshold and providing output as scaled binary** image

Patent Assignee: HEWLETT-PACKARD CO (HEWP); YEN J (YENJ-I)
Inventor: YEN J
Number of Countries: 006 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 696017	A2	19960207	EP 95304268	A	19950620	G06T-003/40	199610 B
JP 8063592	A	19960308	JP 95169393	A	19950705	G06T-003/40	199620
EP 696017	A3	19961002	EP 95304268	A	19950620	G06T-003/40	199645
US 5627953	A	19970506	US 94286561	A	19940805	G06F-015/00	199724

Priority Applications (No Type Date): US 94286561 A 19940805
Cited Patents: 4.Jnl.Ref
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 696017	A2	E	32			
Designated States (Regional): DE FR GB IT						
JP 8063592	A		16			
US 5627953	A		26			

Abstract (Basic): EP 696017 A

The method involves **modelling** a binary **image** as three-dimensional data (X,Y,Z) in which the co-ordinates (X,Y) represent input **image** dimensions, and the third co-ordinate (Z) represents the intensity of the original **image** . The three-dimensional data set by a surface interpolant is fit. The input binary **image** is re-sampled on the fitting surface to provide interpolative data. The interpolative data is thresholded and a scaled binary **image** is output.

The type and the degree of the piece wise polynomial interpolant for surface fitting is determined based on the **image** scaling factor. The interpolant is a **B -spline** tensor product surface of a Beta-spline tensor produce surface.

ADVANTAGE - Avoids quantisation problems.

Dwg.1/35

Title Terms: BINARY; **IMAGE** ; SCALE; PIECE; WISE; POLYNOMIAL; INTERPOLATION ; SAMPLE; INPUT; BINARY; **IMAGE** ; FIT; SURFACE; INTERPOLATION; DATA; DATA ; THRESHOLD; OUTPUT; SCALE; BINARY; **IMAGE**
Derwent Class: T01; W02
International Patent Class (Main): **G06F-015/00** ; G06T-003/40
International Patent Class (Additional): H04N-001/387
File Segment: EPI

16/5/11 (Item 7 from file: 351)
DIALOG(R)File 351:DERWENT WPI

009831350 **Image available**
WPI Acc No: 94-111206/199414
XRPX Acc No: N94-087114

Rendering **trimmed** NURBS **surfaces for computer graphics - using graphic pipeline to compile primitives and apply two step traversal of compiled v-regions independent of tesselation step size**

Patent Assignee: SUN MICROSYSTEMS INC (SUNM)
Inventor: ABI-EZZI S S; SUBRAMANIAM S
Number of Countries: 006 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week	
EP 590765	A2	19940406	EP 93305983	A	19930728	G06F-015/72	199414	B
US 5377320	A	19941227	US 92953971	A	19920930	G06F-003/14	199506	
EP 590765	A3	19940720	EP 93305983	A	19930728	G06F-015/72	199528	
EP 590765	B1	19981216	EP 93305983	A	19930728	G06T-017/20	199903	

Priority Applications (No Type Date): US 92953971 A 19920930
Cited Patents: No-SR.Pub; 2.Jnl.Ref; EP 314335; US 4930091
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 590765	A2	E	42			
Designated States (Regional): DE FR GB NL SE						
US 5377320	A		39			
EP 590765	B1	E				
Designated States (Regional): DE FR GB NL SE						

Abstract (Basic): EP 590765 A

The **rendering** method involves using a compilation and two phase traversal processes. The compilation step converts the graphics primitive into a form which is independent of the tessellation step

size. It also reduces the complexity of the following processing.
The compiler produces monotone v-regions via a step of reducing to **Bezier** components and then monotone v-regions. Traversal steps are then applied. The first step is algorithmically complicated and can a general computer. The second phase is floating point intensive and can be applied to parallel processors.
ADVANTAGE - Allows graphics **image** to be **rendered** more easily and quickly for differing views of **image** .
Dwg.1/20

Title Terms: **RENDER** ; TRIM; SURFACE; COMPUTER; GRAPHIC; GRAPHIC; PIPE; COMPILE; APPLY; TWO; STEP; TRAVERSE; COMPILE; REGION; INDEPENDENT; STEP; SIZE
Derwent Class: T01
International Patent Class (Main): **G06F-003/14** ; **G06F-015/72** ; G06T-017/20
File Segment: EPI

16/5/12 (Item 8 from file: 351)
DIALOG(R)File 351:DERWENT WPI

009777713 **Image available**
WPI Acc No: 94-057565/199407
XRPX Acc No: N94-045308
Drawing method for parametric curve e.g. Bezier **curve of** B- spline **curve - involves applying linear interpolation to straight line passing through not-yet-rounded points only**
Patent Assignee: MITSUBISHI DENKI KK (MITQ)
Inventor: NAKAMURA K
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
US 5287441	A	19940215	US 90593452	A	19901005	G06F-007/00	199407 B

Priority Applications (No Type Date): JP 89267029 A 19891012
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
US 5287441	A		20			

Abstract (Basic): US 5287441 A
In a method of drawing parametric curve on second-dimensional coordinate having discrete coordinate values, when rounding respective points on curve obtained by equal division in adjacent points, the nearest lattice point is not selected, but instead, if the incline value of this point is more than 1, an adjacent point containing integral X-coordinate is approximately computed, whereas if the incline value of this point is less than 1, an adjacent point containing integral Y-coordinate is approximately computed.
Since specific lattice points nearest to the computed points are selected, smooth curve can be drawn without causing redundant point to occur at all. When executing linear interpolation, interpolation is executed by means of a straight line passing through the not-yet-rounded point without using such a line passing through the already rounded point. As a result,
ADVANTAGE - Satisfactory linear interpolation very close to true curve can be achieved constantly.
Dwg.8/12

Title Terms: DRAW; METHOD; PARAMETER; CURVE; CURVE; SPLINE; CURVE; APPLY; LINEAR; INTERPOLATION; STRAIGHT; LINE; PASS; THROUGH; ROUND; POINT
Derwent Class: T01
International Patent Class (Main): **G06F-007/00**
File Segment: EPI

16/5/13 (Item 9 from file: 351)
DIALOG(R)File 351:DERWENT WPI

009703231
WPI Acc No: 93-396784/199350
XRPX Acc No: N93-306679

Image **data conversion to** vector **data - using CT scanning systems to generate point data and surface tracking to allow** B spline **polygon to be generated and passed to CAD system**

Patent Assignee: AMERICAN MEDICAL ELECTRONICS INC (AMME-N); AMEI TECHNOLOGIES INC (AMEI-N)
Inventor: CROOK D F
Number of Countries: 010 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 574099	A2	19931215	EP 93250008	A	19930108	G06F-015/64	199350 B
CA 2087514	A	19931211	CA 2087514	A	19930118	A61B-006/03	199409
EP 574099	A3	19940309	EP 93250008	A	19930108	G06F-015/64	199520
US 5452407	A	19950919	US 92896597	A	19920610	G06F-015/42	199543
			US 93158732	A	19931129		

Priority Applications (No Type Date): US 92896597 A 19920610; US 93158732 A 19931129
Cited Patents: No-SR.Pub; 2.Jnl.Ref; US 4939646
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 574099	A2	E	12			
Designated States (Regional): BE CH DE FR GB IT LI NL						
US 5452407	A		12	Cont of	US 92896597	

Abstract (Basic): EP 574099 A

The **modelling** system is provided to allow interconnection of CAD and CT style technologies. An object, such as a human femur, is scanned(40) by a CT or similar system. The set of slices of **image** data are then passed to an **image** combiner system(42). This initially performs density analysis to identify the area of interest.

Surface tracking techniques are then applied to convert the point data into a surface area. At each data point, the surface is converted into **vectors** of a polygon of **non -uniform , rational B -spline** . This is sent to CAD station for use in 3-D **modelling** .

ADVANTAGE - Automatically provides combination of **image** and **vector** data systems such as in surgical treatments.

Dwg.3/11

Title Terms: **IMAGE** ; DATA; CONVERT; **VECTOR** ; DATA; CT; SCAN; SYSTEM; GENERATE; POINT; DATA; SURFACE; TRACK; ALLOW; SPLINE; POLYGONAL; GENERATE ; PASS; CAD; SYSTEM
Derwent Class: P31; S05; T01; T04
International Patent Class (Main): A61B-006/03; **G06F-015/42 ; G06F-015/64**

International Patent Class (Additional): A61B-005/055
File Segment: EPI; EngPI

16/5/14 (Item 10 from file: 351)
DIALOG(R)File 351:DERWENT WPI

009703230
WPI Acc No: 93-396783/199350
XRPX Acc No: N93-306678

Mfg system for custom fixation device for providing correct settings for damaged bones - scans treatment site to produce image **data and generates set of** vectors **for defining set of points representing treatment site for constructing treatment site** model

Patent Assignee: AMERICAN MEDICAL ELECTRONICS INC (AMME-N); AMEI TECHNOLOGIES INC (AMEI-N)
Inventor: CROOK D F
Number of Countries: 010 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week

EP 574098   A1 19931215 EP 93250007   A 19930108 A61F-002/30   199350 B
CA 2087515 A 19931211 CA 2087515   A 19930118 A61B-017/58   199409
US 5365996 A 19941122 US 92896595   A 19920610 G06F-015/42   199501

Priority Applications (No Type Date): US 92896595 A 19920610
Cited Patents: 01Jnl.Ref; DE 3522196; EP 93869; EP 97001; US 4976737; US 5104592; WO 9107139
Patent Details:
Patent   Kind Lan Pg Filing Notes   Application Patent
EP 574098   A1 E 12
   Designated States (Regional): BE CH DE FR GB IT LI NL
US 5365996 A   11

Abstract (Basic): EP 574098 A
The appts for making customised fixation devices includes a treatment site scanner for producing **image** data representing the treatment site. A system for generating a set of **vectors** is included for defining a set of points. The set of **vectors** represent the treatment site, and the points are associated with a surface, part of a surface representing the treatment site and part of the surface hidden from view.

Each point is associated with a pole of a control polygon of a **non -uniform rational B -spline** . A **model** of the treatment site is constructed from the **non -uniform rational B -spline** from which the fixation device is constructed.

USE/ADVANTAGE - Mfg customised fixation devices for setting bones that have been injured or malformed due to illness or injury. Uses lower profile components using pre-aligned and pre-determined holes. Position of optimum stabilisation can be determined via electronic surgery.

Dwg.3/11

Title Terms: MANUFACTURE; SYSTEM; CUSTOM; FIX; DEVICE; CORRECT; SET; DAMAGE ; BONE; SCAN; TREAT; SITE; PRODUCE; **IMAGE** ; DATA; GENERATE; SET; **VECTOR** ; DEFINE; SET; POINT; REPRESENT; TREAT; SITE; CONSTRUCTION; TREAT; SITE; **MODEL**
Derwent Class: P31; P32; P53; S05; T01
International Patent Class (Main): A61B-017/58; A61F-002/30; **G06F-015/42**
International Patent Class (Additional): A61B-005/055; A61B-006/03; B22C-007/02; B29C-035/08
File Segment: EPI; EngPI

16/5/15   (Item 11 from file: 351)
DIALOG(R)File 351:DERWENT WPI

009534919   **Image available**
WPI Acc No: 93-228459/199329
XRPX Acc No: N93-175344
Modifying geometric object in computer aided design system - using point of origin and target point and transforming move between origin and target into parallel shift of associated control polygons
Patent Assignee: HEWLETT-PACKARD GMBH (HEWP); HEWLETT-PACKARD CO (HEWP)
Inventor: KELLERMANN H; METZGER M
Number of Countries: 004 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 551543	A1	19930721	EP 92100634	A	19920116	G06F-015/72	199329 B
US 5615319	A	19970325	US 934595	A	19930114	G06F-015/00	199718
			US 95438851	A	19950511		

Priority Applications (No Type Date): EP 92100634 A 19920116
Cited Patents: 02Jnl.Ref; EP 277832; US 4821214
Patent Details:
Patent   Kind Lan Pg Filing Notes   Application Patent
EP 551543   A1 E 28
   Designated States (Regional): DE FR GB
US 5615319 A   19 Cont of   US 934595

Abstract (Basic): EP 551543 A

The object modification method involves defining a geometric object as a function (17) pref. a **B -spline** , of a piecewise polynomial function. In order to make a local modification of said geometric object, a point of origin (P) is picked. A second point (P') is defined as a target point through which the modified function (19) should pass.

The move from the point of origin (P) to the target point (P') is transformed into a move, pref. a parallel shift, of the control points of the associated control polygons (18, 20).

ADVANTAGE - Requires minimum of user interaction. Any point of origin may be selected.

Dwg.5/11

Title Terms: MODIFIED; GEOMETRY; OBJECT; COMPUTER; AID; DESIGN; SYSTEM; POINT; ORIGIN; TARGET; POINT; TRANSFORM; MOVE; ORIGIN; TARGET; PARALLEL; SHIFT; ASSOCIATE; CONTROL; POLYGONAL
Index Terms/Additional Words: CAD
Derwent Class: T01
International Patent Class (Main): **G06F-015/00 ; G06F-015/72**
File Segment: EPI

16/5/16 (Item 12 from file: 351)
DIALOG(R)File 351:DERWENT WPI

008890637 **Image available**
WPI Acc No: 92-017906/199203
Related WPI Acc No: 88-221636; 92-010175; 92-010176; 92-017904; 92-017905
XRPX Acc No: N92-013595

Graphic display method for interactive system - performing trimming on B - spline **surface patch descriptions in hardware graphics accelerator**

Patent Assignee: HEWLETT-PACKARD CO (HEWP)
Inventor: FIASCONARO J G
Number of Countries: 003 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 466283	A	19920115	EP 91202444	A	19880204		199203 B
EP 466283	A3	19920527	EP 91202444	A	19880204		199331
EP 466283	B1	19960214	EP 88300942	A	19880204	G06T-017/20	199611
			EP 91202444	A	19880204		
DE 3855012	G	19960328	DE 3855012	A	19880204	G06T-017/20	199618
			EP 91202444	A	19880204		

Priority Applications (No Type Date): EP 91202444 A 19880204
Cited Patents: NoSR.Pub; 1.Jnl.Ref
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 466283	A					
Designated States (Regional): DE FR GB						
EP 466283	B1	E	44	Derived from	EP 88300942	
Designated States (Regional): DE FR GB						
DE 3855012	G			Based on		EP 466283

Abstract (Basic): EP 466283 A

In a graphics display system that represents a surface (1) in XYZ space with first parametric functions (4) in uv space, the first parametric functions are trimmed by a trimming curve (8) composed of several ordered segments (A1-S9), each defined by respective sets of trimming functions.

The system produces a display by traversing segments of the trimming curve by evaluating the sets of parametric trimming functions at selected values of a parameter to find points in uv space which trim the first parametric functions and then using in place of the point in uv space corresponding to the actual end of the present segment the point in uv space corresponding to the beginning of the next segment of the trimmed curve. Finally a visual **image** is displayed of the surface in accordance with the sets of parametric trimming function and using

the step.

ADVANTAGE - Allows high speed trimming. (44pp Dwg.No.2/20

Title Terms: GRAPHIC; DISPLAY; METHOD; INTERACT; SYSTEM; PERFORMANCE; TRIM; SURFACE; PATCH; DESCRIBE; HARDWARE; GRAPHIC; ACCELERATE

Derwent Class: T01

International Patent Class (Main): G06T-017/20

International Patent Class (Additional): **G06F-015/72**

File Segment: EPI

16/5/17 (Item 13 from file: 351)

DIALOG(R)File 351:DERWENT WPI

008882907

WPI Acc No: 92-010176/199202

Related WPI Acc No: 88-221636; 92-010175; 92-017904; 92-017905; 92-017906

XRPX Acc No: N92-007811

Polygon rendering **in graphics display with sub-span trimming - involves sub-division of surface patches** rendered **from sub-spans trimmed by parametric curves in two-dimensional space**

Patent Assignee: HEWLETT-PACKARD CO (HEWP)

Inventor: FIASCONARO J G

Number of Countries: 003 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 464963	A	19920108	EP 91202445	A	19880204		199202 B
EP 464963	A3	19920520					199331
EP 464963	B1	19961030	EP 88300942	A	19880204	G06T-017/20	199648
			EP 91202445	A	19880204		
DE 3855639	G	19961205	DE 3855639	A	19880204	G06T-017/20	199703
			EP 91202445	A	19880204		

Priority Applications (No Type Date): US 8711667 A 19870205

Cited Patents: NoSR.Pub; 2.Jnl.Ref

Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 464963	A					
Designated States (Regional): DE FR GB						
EP 464963	B1	E	45	Div ex	EP 88300942	
Designated States (Regional): DE FR GB						
DE 3855639	G			Based on		EP 464963

Abstract (Basic): EP 464963 A

The computer (86) executes interactive software preparing **B - spline** descriptions of the surface and its parametric trimming curves. The graphics accelerator (91) performs the trimming by dividing the surface into patches and determining their extents in two dimensions of the parameters space for each curve.

A patch is further divided into subpatches when more than a selected number of curves have extents overlapping those for the patch. A subpatch arising from such division is displayed by colour monitor (94).

ADVANTAGE - High-speed trimming is possible without loss of the benefits of surface description by **B -splines** . (45pp Dwg.No.19/45)

Title Terms: POLYGONAL; **RENDER** ; GRAPHIC; DISPLAY; SUB; SPAN; TRIM; SUB; DIVIDE; SURFACE; PATCH; **RENDER** ; SUB; SPAN; TRIM; PARAMETER; CURVE; TWO-DIMENSIONAL; SPACE

Derwent Class: T01; T04

International Patent Class (Main): G06T-017/20

International Patent Class (Additional): **G06F-015/72**

File Segment: EPI

16/5/18 (Item 14 from file: 351)

DIALOG(R)File 351:DERWENT WPI

008882906
WPI Acc No: 92-010175/199202
Related WPI Acc No: 88-221636; 92-010176; 92-017904; 92-017905; 92-017906
XRPX Acc No: N92-007810
Polygon rendering **in graphics display with sub-span trimming - involves description of reshaped polygon by new and remaining vertices of sub-pan cut by trimming curve**
Patent Assignee: HEWLETT-PACKARD CO (HEWP)
Inventor: FIASCONARO J G
Number of Countries: 003 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 464962	A	19920108	EP 91202443	A	19880204		199202 B
EP 464962	A3	19920520					199331
EP 464962	B1	19960911	EP 88300942	A	19880204	G06T-017/20	199641
			EP 91202443	A	19880204		
DE 3855541	G	19961017	DE 3855541	A	19880204	G06T-017/20	199647
			EP 91202443	A	19880204		

Priority Applications (No Type Date): US 8711667 A 19870205
Cited Patents: NoSR.Pub; 2.Jnl.Ref
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 464962	A					
Designated States (Regional): DE FR GB						
EP 464962	B1	E	45	Div ex	EP 88300942	
Designated States (Regional): DE FR GB						
DE 3855541	G			Based on		EP 464962

Abstract (Basic): EP 464962 A
The computer (86) executes interactive software preparing **B - spline** descriptions of the surface and its piecewise-linear trimming curves. The graphics accelerator (19) performs the trimming by traversing separate segments in sequence to find points of intersection in parameter space between the curve and subspan boundaries.
Such points are classified as new vertices entrances, exits or intermediate points of the subspan for use with its remaining vertices in description of a trimmed polygon for display by colour monitor (94).

ADVANTAGE - High-speed trimming is possible without loss of benefits of surface description by **B -splines** .
Dwg.19/20
Title Terms: POLYGONAL; **RENDER** ; GRAPHIC; DISPLAY; SUB; SPAN; TRIM; DESCRIBE; RESHAPING; POLYGONAL; NEW; REMAINING; VERTEX; SUB; PAN; CUT; TRIM; CURVE
Derwent Class: T01; T04
International Patent Class (Main): G06T-017/20
International Patent Class (Additional): **G06F-015/72**
File Segment: EPI

16/5/19 (Item 15 from file: 351)
DIALOG(R)File 351:DERWENT WPI

008771757 **Image available**
WPI Acc No: 91-275772/199138
XRPX Acc No: N91-210661
Character processing system - selects kind of curve to be generated on basis of data obtained by discriminating number of points constructing curve data
Patent Assignee: CANON KK (CANO)
Inventor: YOSHIDA M
Number of Countries: 004 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 447176	A	19910918	EP 91302048	A	19910312		199138 B
EP 447176	A3	19930107	EP 91302048	A	19910312		199345

EP 447176	B1	19970521	EP 91302048	A	19910312	G06T-011/00	199725
DE 69126159	E	19970626	DE 626159	A	19910312	G06T-011/00	199731
			EP 91302048	A	19910312		
US 5740275	A	19980414	US 91668150	A	19910312	G06K-009/48	199822
			US 92921364	A	19920728		
			US 93144549	A	19931101		

Priority Applications (No Type Date): JP 9064973 A 19900314
Cited Patents: NoSR.Pub; 1.Jnl.Ref; GB 2203613
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 447176	A		17			
Designated States (Regional): DE FR GB						
EP 447176	A3		17			
EP 447176	B1	E	17			
Designated States (Regional): DE FR GB						
DE 69126159	E			Based on		EP 447176
US 5740275	A		16	Cont of	US 91668150	
				Cont of	US 92921364	

Abstract (Basic): EP 447176 A

The character processing apparatus converts data stored in a **vector** form into a pattern of a dot form. It includes a discriminataing circuit to discriminate the number of points constructing curve data in the data of the **vector** form. A selector selects the kind of curve to be generated in accordance with the number of points constructing the curve data on the basis of the discrimination result by the discriminating circuit.

A **Bezier** curve or a **B** **spline** curve is selected as a curve to be generated.

ADVANTAGE - Improved timing for conversion. (17pp Dwg.No.1/14

Title Terms: CHARACTER; PROCESS; SYSTEM; SELECT; KIND; CURVE; GENERATE; BASIS; DATA; OBTAIN; DISCRIMINATE; NUMBER; POINT; CONSTRUCTION; CURVE; DATA
Derwent Class: T01
International Patent Class (Main): G06K-009/48; G06T-011/00
International Patent Class (Additional): **G06F-015/72**
File Segment: EPI

16/5/20 (Item 16 from file: 351)
DIALOG(R)File 351:DERWENT WPI

008622627 **Image available**
WPI Acc No: 91-126657/199118
Related WPI Acc No: 91-126650; 91-126655; 91-126663; 91-126664; 91-134721
XRPX Acc No: N91-097470

Parametric surface evaluation for computer graphics display system - determining geometric tangents, **clipping polygon to current viewing boundaries and producing shaded** image

Patent Assignee: IBM CORP (IBMC); INT BUSINESS MACHINES CORP (IBMC)
Inventor: LUKEN W L
Number of Countries: 005 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 425177	A	19910502	EP 90311372	A	19901017		199118 B
EP 425177	A3	19920930	EP 90311372	A	19901017		199340
US 5278948	A	19940111	US 89426386	A	19891024	G06F-015/72	199403
			US 92933602	A	19920821		

Priority Applications (No Type Date): US 89426386 A 19891024; US 92933602 A 19920821
Cited Patents: NoSR.Pub; 1.Jnl.Ref; EP 277832; EP 314335
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 425177	A					
Designated States (Regional): DE FR GB IT						

US 5278948 A 36 Cont of US 89426386

Abstract (Basic): EP 425177 A
The appts has a memory for storing **NURBS** data representation of a parametric surface to be **rendered** . The data includes **modelling** coordinates and an associated weight w for each control point of the matrix. A graphics control processor transforms the control points **modelling** coordinates to view coordinates. The **b -spline** function of the homogeneous coordinates are evaluated at successive v parameter values to obtain top coordinates and top v **derivatives** for a current v parameter value and bottom coordinates and bottom v **derivatives** for an immediately preceding v parameter value.

The **b -spline** functions of the top and bottom coordinates and top and bottom in **derivatives** are evaluated at successive u parameter values, on a per coordinate basis, to obtain values for the u dependence of the top and bottom coordinates, the top and bottom u **derivatives** and the top and bottom u dependence of the top v **derivatives** for each successive u parameter values. The values obtained by the parallel floating point processors are converted into a set of geometric coordinates and a vertex normal for vertices of polygons to be **rendered** .

ADVANTAGE - Reduced external control logic complexity. (43pp Dwg.No.2/13
Title Terms: PARAMETER; SURFACE; EVALUATE; COMPUTER; GRAPHIC; DISPLAY; SYSTEM; DETERMINE; GEOMETRY; **TANGENT** ; CLIP; POLYGONAL; CURRENT; VIEW; BOUNDARY; PRODUCE; SHADE; **IMAGE**
Derwent Class: T01
International Patent Class (Main): **G06F-015/72**
File Segment: EPI

16/5/21 (Item 17 from file: 351)
DIALOG(R)File 351:DERWENT WPI

008622624 **Image available**
WPI Acc No: 91-126654/199118
XRPX Acc No: N91-097467

Graphics display system parametric curve evaluation method - stores NURBS data as sequence of records used to evaluate coordinates of determined parameter points along the curve

Patent Assignee: IBM CORP (IBMC); INT BUSINESS MACHINES CORP (IBMC)
Inventor: LUKEN W L
Number of Countries: 005 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 425174	A	19910502	EP 90311369	A	19901017		199118 B
EP 425174	A3	19921007	EP 90311369	A	19901017		199340
US 5317682	A	19940531	US 89426912	A	19891024	G06F-015/62	199421
			US 92821246	A	19920110		
			US 936713	A	19930121		

Priority Applications (No Type Date): US 89426912 A 19891024; US 92821246 A 19920110; US 936713 A 19930121
Cited Patents: NoSR.Pub; 1.Jnl.Ref; EP 277832; EP 314335; US 4760548
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 425174	A					
Designated States (Regional): DE FR GB IT						
US 5317682	A		23	Cont of	US 89426912	
				Cont of	US 92821246	

Abstract (Basic): EP 425174 A
The method of converting **NURBS** data representative of parametric curve into geometric coordinates of vertices of a polyline for subsequent display, the curve being composed of successive spans, involves organizing and locating the data in memory as a sequence of data records. A first subset of the sequence defines a first span of

the curve with each successive record defining a corresponding span.
The first set of data records are read and used to evaluate the coordinates of determined parameter points along the first span of the curve, with successive points evaluated form successive records.
USE/ADVANTAGE - Evaluating and **rendering** curves for computer graphics display system offers high performance, good numerical stability, cost effectiveness, high speed and accuracy and has the advantages of **NURBS** . (26pp Dwg.No.4/11F)

Title Terms: GRAPHIC; DISPLAY; SYSTEM; PARAMETER; CURVE; EVALUATE; METHOD; STORAGE; DATA; SEQUENCE; RECORD; EVALUATE; COORDINATE; DETERMINE; PARAMETER; POINT; CURVE
Derwent Class: T01
International Patent Class (Main): **G06F-015/62**
International Patent Class (Additional): **G06F-015/35**
File Segment: EPI

16/5/22 (Item 18 from file: 351)
DIALOG(R)File 351:DERWENT WPI

008435201 **Image available**
WPI Acc No: 90-322201/199043
XRPX Acc No: N90-246808

Acquiring interpolation points from straight short vectors - acquiring two dividing points for two vectors and setting interpolation point on straight line passing acquired points

Patent Assignee: TOSHIBA KK (TOKE)
Inventor: YAMADA K
Number of Countries: 005 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 393679	A	19901024	EP 90107459	A	19900419		199043 B
US 5237649	A	19930817	US 90511736	A	19900420	G06F-015/72	199334
KR 9401385	B1	19940221	KR 905390	A	19900418	G06F-015/60	199502

Priority Applications (No Type Date): JP 89100534 A 19890420
Cited Patents: 1.Jnl.Ref
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 393679	A					
Designated States (Regional): DE FR GB						
US 5237649	A		11			

Abstract (Basic): EP 393679 A
Starting from a set of straight vectors (P1-5) representing a curve, the lines are divided into ratios of 1:m in both directions, where m has a preferred value of 6. The set of points thus produced are joined together close to the original points to form a set of short lines (L1-5).
A new set of points (Q1-5) are obtained by dropping perpendiculars from the original vector-ends onto the lines. Standard curve fitting procedures are now used w.r.t. these points.
USE/ADVANTAGE - For curve fitting. Provides a curve which is closer to original than one derived directly from vector-ends. (12pp Dwg.No.5B/8)

Title Terms: ACQUIRE; INTERPOLATION; POINT; STRAIGHT; SHORT; VECTOR; ACQUIRE; TWO; DIVIDE; POINT; TWO; VECTOR; SET; INTERPOLATION; POINT; STRAIGHT; LINE; PASS; ACQUIRE; POINT
Derwent Class: T01
International Patent Class (Main): **G06F-015/60 ; G06F-015/72**
International Patent Class (Additional): **G06F-015/35**
File Segment: EPI

16/5/23 (Item 19 from file: 351)
DIALOG(R)File 351:DERWENT WPI

007587704
WPI Acc No: 88-221636/198832
XRPX Acc No: N88-169015

High performance, three-dimensional graphic display method - representing surface by generating surface patches trimmed in graphics accelerator which computes point representations of trimming curve

Patent Assignee: HEWLETT-PACKARD CO (HEWP)
Inventor: FIASCONARO J G
Number of Countries: 004 Number of Patents: 010
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 277832	A	19880810	EP 88300942	A	19880204		198832 B
US 4999789	A	19910312	US 8711667	A	19870205		199113
US 5226115	A	19930706	US 8711667	A	19870205	G06F-015/62	199328
			US 90526410	A	19900518		
			US 91802787	A	19911206		
US 5243694	A	19930907	US 8711667	A	19870205	G06F-005/72	199337
			US 90526410	A	19900518		
			US 91805728	A	19911206		
US 5299302	A	19940329	US 8711667	A	19870205	G06F-015/20	199412
			US 90526410	A	19900518		
			US 92926140	A	19920805		
US 5303386	A	19940412	US 8711667	A	19870205	G06F-003/14	199414
			US 90526410	A	19900518		
			US 91803503	A	19911206		
EP 277832	B1	19940420	EP 88300942	A	19880204	G06F-015/72	199416
DE 3889134	G	19940526	DE 3889134	A	19880204	G06F-015/72	199422
			EP 88300942	A	19880204		
US 5353389	A	19941004	US 8711667	A	19870205	G06F-015/62	199439
			US 90526410	A	19900518		
			US 91804863	A	19911206		
US 5363478	A	19941108	US 8711667	A	19870205	G06F-015/62	199444
			US 90526410	A	19900518		
			US 91804861	A	19911206		

Priority Applications (No Type Date): US 8711667 A 19870205; US 90526410 A 19900518; US 91802787 A 19911206; US 91805728 A 19911206; US 92926140 A 19920805; US 91803503 A 19911206; US 91804863 A 19911206; US 91804861 A 19911206
Cited Patents: 1.Jnl.Ref; A3...8932; No-SR.Pub
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 277832	A	E	44			
Designated States (Regional): DE FR GB						
US 5226115	A		40	Cont of	US 8711667	
				Div ex	US 90526410	
				Cont of		US 4999789
US 5243694	A		40	Cont of	US 8711667	
				Div ex	US 90526410	
				Cont of		US 4999789
US 5299302	A		40	Cont of	US 8711667	
				Cont of	US 90526410	
US 5303386	A		40	Cont of	US 8711667	
				Div ex	US 90526410	
				Cont of		US 4999789
EP 277832	B1	E	50			
Designated States (Regional): DE FR GB						
DE 3889134	G			Based on		EP 277832
US 5353389	A		40	Cont of	US 8711667	
				Div ex	US 90526410	
				Cont of		US 4999789
US 5363478	A		40	Cont of	US 8711667	
				Div ex	US 90526410	
				Cont of		US 4999789

Abstract (Basic): EP 277832 A
The display method comprises the steps of selecting an ordered collection of untrimmed points, in the parameter space, of which the

interconnecting line segments are boundaries of the region to be trimmed. A trimming function is evaluated to **derive** an ordered collection of trimming points in the parameter space. Points of intersection are determined between straight line segments connecting the trimming points and boundaries of an individual subspan in the surface patch to be trimmed. An ordered collection of trimming points, inside the region to be trimmed, is identified.

A data structure is formed by interleaving the ordered collection of untrimmed points, the intersection points and the ordered collection of points on the region to be trimmed. The structure is traversed for identifying points which describe the trimmed region and these points are selected to represent the trimmed region.

ADVANTAGE - High speed trimming achieved with minimal round off error.

1/20

Title Terms: HIGH; PERFORMANCE; THREE-DIMENSIONAL; GRAPHIC; DISPLAY; METHOD ; REPRESENT; SURFACE; GENERATE; SURFACE; PATCH; TRIM; GRAPHIC; ACCELERATE ; COMPUTATION; POINT; REPRESENT; TRIM; CURVE
Derwent Class: P85; T01; T04
International Patent Class (Main): **G06F-003/14 ; G06F-005/72 ; G06F-015/20 ; G06F-015/62 ; G06F-015/72**
International Patent Class (Additional): G09G-001/06
File Segment: EPI; EngPI

16/5/24 (Item 20 from file: 351)
DIALOG(R)File 351:DERWENT WPI

007359502
WPI Acc No: 87-356508/198751
XRPX Acc No: N87-267188
Curved image **visual representation system for graphics display - computes curve coordinates from forward difference interval coefft. integers for each internal and scaling**
Patent Assignee: IBM CORP (IBMC); INT BUSINESS MACHINES CORP (IBMC)
Inventor: BAKER D C; KAUFFMAN A A
Number of Countries: 015 Number of Patents: 008
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 249705	A	19871223	EP 87105368	A	19870410		198751 B
AU 8773701	A	19871217					198806
BR 8702847	A	19880301					198814
US 4760548	A	19880726	US 86873902	A	19860613		198832
CA 1277787	C	19901211					199104
AU 9065900	A	19910221					199115
EP 249705	B1	19950906	EP 87105368	A	19870410	G06T-011/00	199540
DE 3751505	G	19951012	DE 3751505	A	19870410	G06T-011/00	199546
			EP 87105368	A	19870410		

Priority Applications (No Type Date): US 86873902 A 19860613
Cited Patents: 3.Jnl.Ref; A3...9026; No-Sr.Pub
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP 249705	A	E	21			
Designated States (Regional): AT BE CH DE ES FR GB IT LI NL SE						
US 4760548	A		17			
EP 249705	B1	E	23			
Designated States (Regional): AT BE CH DE ES FR GB IT LI NL SE						
DE 3751505	G			Based on		EP 249705

Abstract (Basic): EP 249705 A

The representation of the curved **image** is produced from a set of control points defining the curve which are input for each dimension and from a number of intervals of the curve to be computed. Following initialisation (60), a set of scaled **vector** coefficient integers is computed (64) for each dimension from the set of input control points for that dimension and the interval integer number. The forward difference interval coefficient integers are computed (66) for each

dimension for each interval from the sealed **vector** coefficient integers for the respective dimension and from the interval integer number.

The curve co-ordinate values are computed for each interval for each dimension from the forward difference interval coefficient integers for the respective dimension for each interval and from the respective sealing parameter. The curve is displayed by displaying curve coordinate points according to computed curve coordinate values for each dimension and straight lines which successively connect the computed curve coordinate points.

ADVANTAGE - Curves are produced using **B -spline** form more accurately than have been achieved using floating point methods.

Title Terms: CURVE; **IMAGE** ; VISUAL; REPRESENT; SYSTEM; GRAPHIC; DISPLAY; COMPUTATION; CURVE; COORDINATE; FORWARD; DIFFER; INTERVAL; COEFFICIENT; INTEGER; INTERNAL; SCALE

Derwent Class: T01

International Patent Class (Main): G06T-011/00

International Patent Class (Additional): **G06F-015/72** ; G06K-009/36

File Segment: EPI

Set	Items	Description
S1	8	NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-NE? OR BSPLINE?
S2	1	S1 (S) (VECTOR? OR DERIVATIVE?)
S3	0	S2 AND BEZIER?
S4	0	S3 (S) (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5	0	S4 (S) (PIPE? OR RENDER? OR MODEL? OR REPRESENTAT? OR CAD)
S6	0	S1 AND BEZIER?
S7	1	S1 AND (VECTOR? OR DERIVATIVE?)

File 80:IAC Aerospace/Def.Mkts(R) 1986-1999/Mar 03

File 587:Jane`s Defense&Aerospace 1999/Feb W4

File 264:DIALOG Defense Newsletters 1989-1999/Mar 02

File 248:PIRA 1975-1999Mar W3

7/3,K/1 (Item 1 from file: 248)
DIALOG(R)File 248:PIRA

00209336 Pira Acc. Num.: 9425736 Pira Abstract Numbers: 02-90-03088
Title: HIGH QUALITY CHARACTER GENERATION METHOD USING CONTOUR REPRESENTATION
Authors: Naoi S; Nishikawa K; Nagata S
Source: Paper presented at Society for Imaging Science and Technology SPSE, Advances in Non-impact Printing Technologies: 4th International Congress, held 20-25 March 1988, New Orleans, USA, pp 631-646, [Springfield, USA: SIST/SPSE, 1988, 665pp, $55.00 (655.39) (6549)
Publication Year: 1988
Document Type: Conference Publication
Language: English

...Abstract: are represented automatically in compressed form at high-speed from three types of data: contour **vector** data obtained by extracting bending points, attribute data by recognizing vertical and horizontal strokes and serifs, curve data by approximating the contour of curved strokes using a **B - spline** function. Character patterns are produced through line width control and curve generation from this data.
...Descriptors: **VECTOR** ;

```
Set     Items   Description
S1        425   NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-
             NE? OR BSPLINE?
S2         34   S1 (S) (VECTOR? OR DERIVATIVE?)
S3          9   S2 AND BEZIER?
S4          5   S3 (S) (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-
             ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5          3   S4 (S) (PIPE? OR RENDER? OR MODEL? OR REPRESENTAT? OR CAD)
S6          5   RD S4 (unique items)
S7          5   S6 NOT PY>1997
S8          5   S7 NOT PD>970425
File 621:IAC New Prod.Annou.(R) 1985-1999/Mar 03
         (c) 1999 Information Access Co
File 278:Microcomputer Software Guide 1999/Feb
         (c) 1999 Reed Elsevier Inc.
File 256:SoftBase:Reviews,Companies&Prods. 85-1999/Feb
         (c)1999 Info.Sources Inc
```

8/3,K/1 (Item 1 from file: 621)
DIALOG(R)File 621:IAC New Prod.Annou.(R)

00281981 00281981

Elcee's XFORMER breathes new life to scanned/bitmapped images

News Release
DATELINE: Boca Raton, FL November 6, 1990 WORD COUNT: 305

...images and graphic
objects with equal ease and enjoy the best of both image and **vector** graphic worlds. With XFORMER, a user can convert or transform bitmapped image into **vectorized** objects, edit the image, and manipulate the objects. It accepts inputs from TIFF and PCX...

...geometrically accurate objects. These
objects may be lines, polygons, rectangles, ellipses, arcs, or more sophisticated **Bezier** or **B -spline curves** . XFORMER supplies methods to determine the object's skeleton, **outline** or their combination, and to convert object back to rasterized image.
XFORMER is a complete...

8/3,K/2 (Item 2 from file: 621)
DIALOG(R)File 621:IAC New Prod.Annou.(R)

00272094 00272094

RAND TECHNOLOGIES INTRODUCES CIMATRON CAD/CAM SYSTEM STARTING AT $10,000

News Release
DATELINE: Toronto, Ontario August 30, 1990 WORD COUNT: 1416

...to) ten
simultaneously active windows, allows users to quickly and easily create complex wireframe and **surface** models. Standard **curve** types include line, arc, conic, helix, composite, offset, projected, corner, cubic spline, **Bezier** spline, **B -spline** and **NURBS** . Surfacing entities include, drive (parallel/normal, cross-sections and edges), ruled, revolved, fillet (constant and variable), trimmed, bi-cubic mesh, **Bezier** , **B - spline** , **NURBS** and mesh of patches. **Surface** shading
and hidden-line removal programs are included.
Use of an intelligent three button mouse...

...manufacturing engineers to machine draft
walled parts, webs and ribs directly from 2D or 3D **curves** without the need of **surfaces** .
Automatic planer clearance rouflnes can quicKly and efficiently "rough-out" multi-**surfaced** parts. 3-axis milling algorithms allow **vectored** , radial, or flow-line multi-**surface** , gouge-free machining. Area clearance, profiling, and pocketing (with islands) routines include "real-world" operations...

8/3,K/3 (Item 3 from file: 621)
DIALOG(R)File 621:IAC New Prod.Annou.(R)

00208431 00208431

MCS TO DEMONSTRATE 3-D CADD/CAM SOFTWARE FOR 80386-BASED PERSONAL COMPUTERS AT AUTOFACT

News Release

DATELINE: CHICAGO, IL   October 31, 1988   WORD COUNT: 1[illegible]

...1988, will consist of six software modules: 3-D Design and Drafting (available immediately), Base **Surfaces** , Extended **Surfaces** , NURB (**Non** - **Uniform** **Rational** B-**Surface**), 2 1/2-D Numerical Control Machining, and 3-Axis Numerical Control Machining.
MCS will...

...995)
3-D wireframe design
Complete drafting capabilities
Notes, labels, dimensions, cross-hatching, arrow on **curve** , balloon, text edit, **surface** finish, true-position tolerancing, centerlines, and national and user-defined drafting standards
Geometry
Points, lines...

...components
EGA, PGA, and VGA support
Comprehensive file management functions
ANVIL (TM) translator
Options
Base **Surfaces** ($995)
Plane, cylinder, **surfaces** of revolution , tabulated cylinder, ruled **surface** , developable **surface** , sphere, torus, cone, plane slice, and general **surface** intersection
Extended **Surfaces** ($1,995)
Curve -driven, faring (fillet), **twisted** **vector** , Coon's blended, and **Bezier**
NURB (**Non -Uniform** **Rational** B-**Surface**) ($995)
2 1/2-D Numerical Control Machining ($1,995)
3-Axis Numerical Control Machining...

...ANVIL (TM) Product Line
ANVIL-5000: 3-D CADD/CAM software that integrates drafting, wireframe, **surface** and solids modeling, **curve** and section analysis, finite-element mesh, and numerical control (both 3-and 5-axis) using...
...CADD/CAM software for 386-based and 286-based personal computers that integrates drafting, wireframe, **surface** modeling, section analysis, 2 1/2-D numerical control and 3-axis numerical control using...

8/3,K/4   (Item 4 from file: 621)
DIALOG(R)File 621:IAC New Prod.Annou.(R)

00183855   00183855

MCS TO INTRODUCE 3-D CADD/CAM SOFTWARE FOR 80386-BASED PERSONAL COMPUTERS AT NCGA '88

News Release
DATELINE: IRVINE, CA   February 25, 1988   WORD COUNT: 1077

...1988, will consist of six software modules: 3-D Design and Drafting (available immediately), Base **Surfaces** , Extended **Surfaces** , NURB (**Non** - **Uniform** **Rational** B-**Surface**), 2 1/2-D Numerical Control Machining, and 3-Axis Numerical Control Machining.
MCS will...

...995)
3-D wireframe design
Complete drafting capabilities
Notes, labels, dimensions, cross-hatching, arrow on **curve** , balloon, text edit, **surface** finish, t rue-position tolerancing, centerlines, and national and user-defined drafting standards
Geometry

Points...

...components
EGA, PGA, and VGA support
Comprehensive file management functions
ANVIL (TM) translator
Options
Base **Surfaces** ($995)
Plane, cylinder, **surfaces** of revolution, tabulated cylinder, ruled **surface** , developable **surface** , sphere, torus, cone, plane slice, and general **surface** intersection
Extended **Surfaces** ($1,995)
Curve -driven, faring (fillet), **twisted** **vector** , Coon's blended, and **Bezier**
NURB (**Non -Uniform** **Rational** B-**Surface**) ($995)
2 1/2-D Numerical Control Machining ($1,995)
3-Axis Numerical Control Machining...

...ANVIL (TM) Product Line
ANVIL-5000: 3-D CADD/CAM software that integrates drafting, wireframe, **surface** and solids modeling, **curve** and section analysis, finite-element mesh, and numerical control (both 3- and 5-axis) using...
...CADD/CAM software for 386-based and 286-based personal computers that integrates drafting, wireframe, **surface** modeling, section analysis, 2 1/2-D numerical control and 3-axis numerical control using...

8/3,K/5 (Item 1 from file: 256)
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

00098603 DOCUMENT TYPE: Review

PRODUCT NAMES: Expression (623512)

TITLE: Expression: More sophisticated strokes at the fingertip
AUTHOR: Hamlin, J. Scott
SOURCE: PC Graphics & Video, v5 n11 p66(3) Nov 1996
ISSN: 1060-5282

RECORD TYPE: Review
REVIEW TYPE: Review
GRADE: A

REVISION DATE: 980617

Fractal Design's Fractal Design Expression gives graphics illustrators natural brushstrokes in a **vector** -based program that produces precise, smooth lines. Computer artists no longer have to depend on the bitmap world, and they can now produce **vector** images that do not appear `computer-generated.' Expression's foundation is in its Skeletal Stroke...
...are the basis for applying more refined strokes. Each stroke culminates from a selection of **vector** artwork. With the Skeletal Stroke, Strokes/ **vector** artwork are applied to a line. The stroke shapes to the line and can be edited with a substantial number of characteristics, including opacity, shear, **twist** , width, and color. With Opacity settings, natural media strokes can generate an accumulation of effects...

...drawn, and the line or stroke can be edited separately. Expression also provides FreeHand and **Bezier** drawing tools, a Polyline tool and a **B -Spline** tool, and excellent pressure-sensitive tablet support.

```
Set      Items   Description
S1        7611   NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-
                 NE? OR BSPLINE?
S2         655   S1 AND (VECTOR? OR DERIVATIVE?)
S3          60   S2 AND BEZIER?
S4          51   S3 AND (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-
                 ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5          40   RD (unique items)
S6          36   S5 NOT PY>1997
S7          33   S6 NOT PD>970425
File 108:Aerospace Database 1962-1999/Jan
         (c) 1999 AIAA
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         (c) 1999 Engineering Info. Inc.
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         (c) 1999 Cambridge Sci Abs
File 238:Abs. in New Tech & Eng. 1981-1999/Jan
         (c) 1999 Reed-Elsevier (UK) Ltd.
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         (c) 1999 UMI
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         (c)  Information Today, Inc
File  65:Inside Conferences 1993-1999/Feb W4
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         (c) 1999 Cambridge Sci Abs
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         (c)1999 Japan Science and Tech Corp(JST)
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         (c) 1999 The HW Wilson Co
File  61:LISA(LIBRARY&INFOSCI) 1969-1999/Feb
         (c) 1999 Reed Reference Publishing
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         (c) 1999 Info. Access Co.
File 233:Microcomputer Abstracts 1974-1999/Feb
         (c) 1999 Information Today Incl.
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         Comp&distr 1998 NTIS, Intl Copyright All Righ
File 144:Pascal 1973-1999/Jan
         (c) 1999 INIST/CNRS
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         (c) 1999 SAE Inc.
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File  62:SPIN(R) 1975-1999/Jan W5
         (c) 1999 American Institute of Physics
File  99:Wilson Appl. Sci & Tech Abs 1983-1999/Jan
         (c) 1999 The HW Wilson Co.
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7/5/1 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04645848 E.I. No: EIP97033566292
Title: Analytical solid modeling using dual kriging
Author: Limalem, Anis; EIMaraghy, Hoda A.
Corporate Source: McMaster Univ, Hamilton, Ont, Can
Conference Title: Proceedings of the 1995 ASME Design Engineering Technical Conferences
Conference Location: Boston, MA, USA Conference Date: 19950917-19950920
Sponsor: ASME DE
E.I. Conference No.: 46152
Source: 21st Annual Design Automation Conference American Society of Mechanical Engineers, Design Engineering Division (Publication) DE v 82 n 1 1995.. p 127-132
Publication Year: 1995
CODEN: AMEDEH
Language: English
Document Type: CP; (Conference Proceedings) Treatment: A; (Applications); G; (General Review); T; (Theoretical)
Journal Announcement: 9704W5
Abstract: This paper presents a new method for representing analytical or parametric solids based on dual kriging. Complex solids may be represented with a single model without any limitation on the number of data points. The equations of the parametric model are derived in a simple and novel way by considering the combination of three interpolation profiles. Dual kriging was successfully used for **curve /surface** modeling. It is a general method which incorporates several interpolation techniques in a single formulation, such as piecewise interpolation, cubic splines and **Bezier curves /surfaces** and solids. We will show that **B -splines** and **NURBS** are special cases of dual kriging. The model generated passes through all data points, and elementary shapes such as conics, cylinders are represented exactly. In addition, **derivatives** and linear constraints may be incorporated in the kriging model as well as uncertainties on data points. (Author abstract) 8 Refs.
Descriptors: *Computer aided design; Interpolation; Finite element method ; Animation; Piecewise linear techniques; Computational geometry
Identifiers: Dual kriging; Parametric **curve** modeling
Classification Codes:
723.5 (Computer Applications); 921.6 (Numerical Methods); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory)
723 (Computer Software); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/2 (Item 2 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04598736 E.I. No: EIP97013497083
Title: Gregory-type patches bounded by low degree integral curves **for G**2 continuity**
Author: Miura, K.T.; Wang, K.-K.
Corporate Source: Univ of Aizu, Fukushima, Jpn
Source: Computer Aided Geometric Design v 13 n 9 Dec 1996. p 793-810
Publication Year: 1996
CODEN: CAGDEX ISSN: 0167-8396
Language: English
Document Type: JA; (Journal Article) Treatment: A; (Applications); T; (Theoretical)
Journal Announcement: 9703W2
Abstract: G**2 continuity of free-form **surfaces** is sometimes very important in engineering applications. The conditions for G**2 continuity to connect two **Bezier** patches were studied and methods have been developed to ensure it. However, they have some restrictions on the shapes of patches of the **Bezier** patch formulation. Gregory patch is a kind of free-form **surface** patch which is extended from **Bezier** patch so that

four first **derivatives** on its boundary **curves** can be specified without restrictions of the compatibility condition. Several types of Gregory patches have been developed for integral, rational, and **NURBS** boundary **curves** . In this paper, we propose some integral boundary Gregory-type patches bounded by cubic and quartic **curves** for G**2 continuity. (Author abstract) 23 Refs.

Descriptors: Computer aided design; Geometry; **Surfaces** ; Mathematical techniques; Computational geometry

Identifiers: Gregory-type patch; **Bezier** patch

Classification Codes:

723.5 (Computer Applications); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory)

723 (Computer Software); 921 (Applied Mathematics)

72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/3 (Item 3 from file: 8)

DIALOG(R)File 8:Ei Compendex(R)

04264357 E.I. No: EIP95102886260

Title: General construction scheme for unit quaternion curves **with simple high order** derivatives

Author: Kim, Myoung-Jun; Kim, Myung-Soo; Shin, Sung Yong

Corporate Source: Korea Advanced Inst of Science and Technology (KAIST), Taejon, S Korea

Conference Title: Proceedings of the 22nd Annual ACM Conference on Computer Graphics and Interactive Techniques

Conference Location: Los Angeles, CA, USA Conference Date: 19950809-19950811

E.I. Conference No.: 43706

Source: Proceedings of the ACM SIGGRAPH Conference on Computer Graphics 1995. ACM, New York, NY, USA. p 369-376

Publication Year: 1995

CODEN: 002150

Language: English

Document Type: CA; (Conference Article) Treatment: A; (Applications); T ; (Theoretical)

Journal Announcement: 9512W1

Abstract: This paper proposes a new class of unit quaternion **curves** in SO(3). A general method is developed that transforms a **curve** in R**3 (defined as a weighted sum of basis functions) into its unit quaternion analogue in SO(3). Applying the method to well-known spline **curves** (such as **Bezier** , Hermite, and **B -spline** **curves**), we are able to construct various unit quaternion **curves** which share many important differential properties with their original **curves** . Many of our naive common beliefs in geometry break down even in the simple non-Euclidean space S**3 or SO(3). For example, the de Casteljau type construction of cubic **B -spline** quaternion **curves** does not preserve C**2-continuity left bracket 10 right bracket . Through the use of decomposition into simple primitive quaternion **curves** , our quaternion **curves** preserve most of the algebraic and differential properties of the original spline **curves** . (Author abstract) 20 Refs.

Descriptors: *Computer graphics; Computational geometry; Computer simulation; Algorithms; Mathematical transformations; Algebra; Animation; Interpolation; Recursive functions

Identifiers: Quaternion **curves** ; **B spline** **curves** ; Non Euclidean space; Algebraic construction; Control points

Classification Codes:

723.5 (Computer Applications); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory); 921.3 (Mathematical Transformations); 921.1 (Algebra); 921.6 (Numerical Methods); 721.1 (Computer Theory, Includes Formal Logic, Automata Theory, Switching Theory, Programming Theory)

723 (Computer Software); 921 (Applied Mathematics); 721 (Computer Circuits & Logic Elements)

72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/4 (Item 4 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04191114 E.I. No: EIP94112424743
Title: Experiments with curvature-continuous patch-boundary fitting
Author: Bartels, Richard H.; Warn, David R.
Corporate Source: Univ of Waterloo, Waterloo, IA, USA
Source: IEEE Computer Graphics and Applications v 14 n 5 Sept 1994. p 64-73
Publication Year: 1994
CODEN: ICGADZ ISSN: 0272-1716
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical); X; (Experimental)
Journal Announcement: 9508W4
Abstract: New techniques of fitting **curves** in **surface** modeling that enhance the global curvature properties for systems of three-dimensional **Bezier** patches were presented. The definitive overall **Bezier surface** quality was enhanced by refitting the **curves** sans interpolations, by employing **B -splines** with minimal knots to obtain a plausible fitting tolerance, and by conforming parameter-to-data assignments. Providing data as the whole network of **curves** rather than separate horizontal or vertical **curves** served as another probable correlation. 12 Refs.
Descriptors: Computer graphics; **Curve** fitting; Mathematical models; **Surfaces** ; Three dimensional; Drawing (graphics); Approximation theory; Least squares approximations; **Vectors** ; Interpolation
Identifiers: **Bezier** boundary **curves** ; **B splines** ; Gaussian curvature; Autoshape; Pillow effect
Classification Codes:
723.5 (Computer Applications); 921.6 (Numerical Methods); 921.1 (Algebra)
723 (Computer Software); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/5 (Item 5 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04139799 E.I. No: EIP95042671109
Title: Rational patches on quadric surfaces
Author: Dietz, Roland; Hoschek, Josef; Juettler, Bert
Corporate Source: Technische Hochschule Darmstadt, Darmstadt, Ger
Source: Computer Aided Design v 27 n 1 Jan 1995. p 27-40
Publication Year: 1995
CODEN: CAIDA5 ISSN: 0010-4485
Language: English
Document Type: JA; (Journal Article) Treatment: G; (General Review); T; (Theoretical)
Journal Announcement: 9506W3
Abstract: The paper discusses rational **curve** segments and **surface** patches on quadric **surfaces** . Detailed constructions of rational **Bezier** patches from given boundaries on a unit sphere and on a hyperbolic paraboloid are presented based on a generalization of the stereographic projection. The method is applied to interpolation with rational **curves** on quadrics. The results are extended to rational **B -spline** representations by discussion of products of **B -spline** functions. Finally, the generalization of the constructions to arbitrary nondegenerated quadric **surfaces** is **outlined** . (Author abstract) 17 Refs.
Descriptors: Computer aided design; **Surfaces** ; Interpolation; Algebra; Three dimensional; **Vectors** ; Mathematical models; Computational geometry
Identifiers: Rational **curves** ; Rational **surfaces** ; Generalized stereographic projection
Classification Codes:
723.5 (Computer Applications); 931.2 (Physical Properties of Gases, Liquids & Solids); 921.6 (Numerical Methods); 921.1 (Algebra)

723 (Computer Software); 931 (Applied Physics); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 93 (ENGINEERING PHYSICS); 92 (ENGINEERING MATHEMATICS)

7/5/6 (Item 6 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04133717 E.I. No: EIP95042665592
Title: Algorithm for degree reduction of B- spline curves
Author: Piegl, Les; Tiller, Wayne
Corporate Source: Univ of South Florida, Tampa, FL, USA
Source: Computer Aided Design v 27 n 2 Feb 1995. p 101-110
Publication Year: 1995
CODEN: CAIDA5 ISSN: 0010-4485
Language: English
Document Type: JA; (Journal Article) Treatment: A; (Applications); T; (Theoretical)
Journal Announcement: 9506W2
Abstract: An algorithmic approach to degree reduction of **B -spline curves** is presented. The method consists of the following steps: (a) decompose the **B -spline curve** into **Bezier** pieces on the fly, (b) degree reduce each **Bezier** piece, and (c) remove the unnecessary knots. A complete algorithm and precise error control are provided. (Author abstract) 11 Refs.
Descriptors: Algorithms; Computational geometry; **Surfaces** ; Piecewise linear techniques; Errors; Approximation theory; Polynomials; **Vectors** ; Mathematical models
Identifiers: **B spline curves** ; Degree reduction; **Bezier** pieces; Error control
Classification Codes:
921.6 (Numerical Methods); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory); 921.1 (Algebra)
921 (Applied Mathematics)
92 (ENGINEERING MATHEMATICS)

7/5/7 (Item 7 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04094309 E.I. No: EIP95022595791
Title: Computing values and derivatives **of** Bezier **and** B- spline **tensor products**
Author: Mann, Stephen; DeRose, Tony
Corporate Source: Univ of Waterloo, Waterloo, Ont, Can
Source: Computer Aided Geometric Design v 12 n 1 Feb 1995. p 107-110
Publication Year: 1995
CODEN: CAGDEX ISSN: 0167-8396
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical)
Journal Announcement: 9505W1
Abstract: We give an efficient algorithm for evaluating **Bezier** and **B -spline** tensor products for both positions and normals. The algorithm is an extension of a method for computing the position and tangent to a **Bezier curve** , and is asymptotically twice as fast as the standard bilinear algorithm. (Author abstract) 4 Refs.
Descriptors: Computer aided design; Algorithms; Geometry; Tensors; **Surfaces** ; Interpolation; Codes (symbols); Evaluation
Identifiers: **Bezier** tensor product; **B -spline** tensor product; Tensor product **surfaces** ; Blossoms; Rendering; Repeated bilinear interpolation
Classification Codes:
723.5 (Computer Applications); 921.6 (Numerical Methods); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory); 921.1 (Algebra); 723.2 (Data Processing)
723 (Computer Software); 921 (Applied Mathematics)

72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/8 (Item 8 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04007347 E.I. No: EIP94122478059
Title: Single-valued tubular patches
Author: Sanchez-Reyes, Javier
Corporate Source: Polytechnic Univ of Catalonia, Barcelona, Spain
Source: Computer Aided Geometric Design v 11 n 5 Oct 1994. p 565-592
Publication Year: 1994
CODEN: CAGDEX ISSN: 0167-8396
Language: English
Document Type: JA; (Journal Article) Treatment: G; (General Review); T; (Theoretical)
Journal Announcement: 9502W1
Abstract: A method is given for the construction of tubular **surface** patches. These **surfaces** are built from a 3D directrix **curve** that is single-valued either in Cartesian or in cylindrical coordinates. Control points for defining the patch lie on certain directions the distribution of which is controlled by two knot **vectors** . The **surface** is evaluated following a **B -spline** scheme. The distance between the **surface** and the directrix is a bivariate single-valued expression of two variables: the parameter corresponding to the directrix and an angular parameter around the directrix. The main advantage of this representation is that there exists a simple Point Membership Classification algorithm for the volume defined between two tubular patches. Therefore, such volumes can be incorporated as nodes in a CSG context. (Author abstract) 16 Refs.
Descriptors: Computer aided design; **Surfaces** ; Cylinders (shapes); Geometry; Three dimensional; **Curve** fitting; Parameter estimation; Algorithms; **Vectors** ; Graphic methods
Identifiers: Tubular **surface** patches; **B spline** scheme; Point Membership Classification algorithm; Three dimensional directrix **curves** ; **Bezier curves** ; Polar coordinates; Cylindrical coordinates
Classification Codes:
723.5 (Computer Applications); 921.6 (Numerical Methods); 731.1 (Control Systems); 723.1 (Computer Programming); 722.2 (Computer Peripheral Equipment)
723 (Computer Software); 921 (Applied Mathematics); 731 (Automatic Control Principles); 722 (Computer Hardware)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS); 73 (CONTROL ENGINEERING)

7/5/9 (Item 9 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

03977742 E.I. No: EIP94112407676
Title: Using general polar values as control points for polynomial curves
Author: Duchaineau, Mark A.
Corporate Source: Univ of California, Davis, CA, USA
Source: Computer Aided Geometric Design v 11 n 4 Aug 1994. p 411-423
Publication Year: 1994
CODEN: CAGDEX ISSN: 0167-8396
Language: English
Document Type: JA; (Journal Article) Treatment: A; (Applications); T; (Theoretical)
Journal Announcement: 9412W4
Abstract: Blossoming has proven to be a useful technique for understanding and generalizing polynomial **curves** through the use of the polar form. This paper shows that general polar values may be used to control polynomial **curves** when a related matrix is invertible. The inverse matrix provides a useful translation from these general blossom control points to well known ones such as those of **Bezier** . The special

case in which the polar form can be evaluated through pairwise affine combinations is characterized, allowing the arguments of the blossom control points to be chosen in a manner akin to choosing the knot **vector** of a **B -spline** segment. The number of free parameters for specifying the blossom control points of polynomial **curves** is increased significantly over the **B -spline** case. (Author abstract) 10 Refs.
Descriptors: Polynomials; Matrix algebra; Inverse problems; **Vectors** ; Function evaluation; Geometry
Identifiers: Blossoming; Polar form; Polynomial **curve** representation; **B spline** ; Affine combination; Control point; Knot **vector**
Classification Codes:
921.1 (Algebra); 921.6 (Numerical Methods); 921.4 (Combinatorial Mathematics, Includes Graph Theory, Set Theory)
921 (Applied Mathematics)
92 (ENGINEERING MATHEMATICS)

7/5/10 (Item 10 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

03747808 E.I. No: EIP93111132417
Title: Polar forms for geometrically continuous spline curves **of arbitrary degree**
Author: Seidel, Hans-Peter
Corporate Source: Univ of Waterloo, Waterloo, Ont, Can
Source: ACM Transactions on Graphics v 12 n 1 Jan 1993. p 1-34
Publication Year: 1993
CODEN: ATGRDF ISSN: 0730-0301
Language: English
Document Type: JA; (Journal Article) Treatment: G; (General Review); L; (Literature Review/Bibliography); T; (Theoretical)
Journal Announcement: 9401W2
Abstract: This paper studies geometrically continuous spline **curves** of arbitrary degree. Based on the concept of universal splines, we obtain geometric constructions for both the spline control points and for the **Bezier** points and give algorithms for computing locally supported basis functions and for knot insertion. The geometric constructions are based on the intersection of osculating flats. The concept of universal splines is defined in such a way that these intersections are guaranteed to exist. As a result of this development, we obtain a generalization of polar forms to geometrically continuous spline **curves** by intersecting osculating flats. The presented algorithms have been coded in Maple, and concrete examples illustrate the approach. (Author abstract) 62 Refs.
Descriptors: Computer graphics; Graphic methods; Geometry; Algorithms; Matrix algebra; Computer aided design; Poles and zeros; **Vectors** ; Computational methods
Identifiers: Polar forms; Geometrically continuous spline **curves** ; **Bezier** point; de Boor algorithm; **B spline** ; Knot insertion; Connection matrix; Spline control point; Maple; Osculating flat
Classification Codes:
723.5 (Computer Applications); 921.6 (Numerical Methods); 921.1 (Algebra)
723 (Computer Software); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/11 (Item 11 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

03059042 E.I. Monthly No: EI9105050906
Title: Approximation and geometric modeling with simplex B- splines **associated with irregular triangles.**
Author: Auerbach, S.; Gmelig Meyling, R. H. J.; Neamtu, M.; Schaeben, H.
Corporate Source: Univ of Bonn, West Ger
Source: Computer Aided Geometric Design v 8 n 1 Feb 1991 p 67-87
Publication Year: 1991

CODEN: CAGDEX ISSN: 0167-8396
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical)
Journal Announcement: 9105
Abstract: Bivariate quadratic simplicial **B -splines** defined by their corresponding set of knots derived from a (suboptimal) constrained Delaunay triangulation of the domain are employed to obtain a C**1-smooth **surface** . The generation of triangle vertices is adjusted to the areal distribution of the data in the domain. We emphasize here that the vertices of the triangles initially define the knots of the **B -splines** and do generally not coincide with the abscissae of the data. Thus, this approach is well suited to process scattered data. With each vertex of a given triangle we associate two additional points which give rise to six configurations of five knots defining six linearly independent bivariate quadratic **B - splines** supported on the convex hull of the corresponding five knots. If we consider the vertices of the triangulation as threefold knots, the bivariate quadratic **B -splines** turn into the well known bivariate quadratic Bernstein-**Bezier** -form polynomials on triangles. Thus we might be led to think of **B -splines** as of smoothed versions of Bernstein-**Bezier** polynomials with respect to the entire domain. From the degenerate Bernstein-**Bezier** situation we deduce rules how to locate the additional points associated with each vertex to establish knot configurations that allow the modeling of discontinuities of the function itself or any of its directional derivaties. We find that four collinear knots out of the set of five defining an individual quadratic **B -spline** generate a discontinuity in the **surface** along the line they constitute, and that analogously three collinear knots generate a discontinuity in a first **derivative** . Finally, the coefficients of the linear combinations of normalized simplicial **B - splines** are visualized as geometric control points satisfying the convex hull property. Thus, bivariate quadratic **B -splines** associated with irregular triangles provide a great flexibility to approximate and model fast changing or even functions with any given discontinuities from scattered data. An example for least squares approximation with simplex splines is presented. (Author abstract) 31 Refs.
Descriptors: COMPUTER AIDED DESIGN; MATHEMATICAL TECHNIQUES--Interpolation; **SURFACES**
Identifiers: COMPUTER AIDED GEOMETRIC DESIGN; GEOMETRIC MODELING; **B - SPLINES** ; DELAUNEY TRIANGULATION; CONSTRAINED TRIANGULATION; APPROXIMATION
Classification Codes:
723 (Computer Software); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/12 (Item 12 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

02705867 E.I. Monthly No: EI8902009463
Title: Shape optimal design using high-order elements.
Author: Shyy, Y. K.; Fleury, C.; Izadpanah, K.
Corporate Source: Univ of California at Los Angeles, Los Angeles, CA, USA
Source: Computer Methods in Applied Mechanics and Engineering v 71 n 1 Nov 1988 p 99-116
Publication Year: 1988
CODEN: CMMECC ISSN: 0374-2830
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical)
Journal Announcement: 8902
Abstract: Research results obtained recently in using the p-version of the finite element method (FEM) for shape optimal design are presented. The use of **Bezier** and **B -spline** **curves** to define design elements has proven to be an excellent way to model the geometry of the design problem. The p-version 2D elastic element was extended to employ part of a **Bezier** or **B -spline** **curve** as its element side for this purpose. This new element has been tested successfully with the patch test. Moreover, it is compatible, has no preferred direction, and contains all the required rigid-body modes (three zero eigenvalues are found in the element stiffness matrix. (Edited author abstract) 6 Refs.

Descriptors: *COMPUTER AIDED DESIGN; MATHEMATICAL TECHNIQUES--Finite Element Method
Identifiers: **BEZIER CURVES** ; RIGID-BODY MODES; VON MISES STRESS; CONLIN OPTIMIZER; KNOT **VECTOR** ; SHAPE OPTIMAL DESIGN
Classification Codes:
723 (Computer Software); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

7/5/13 (Item 13 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

01025404 E.I. Monthly No: EI8106047023 E.I. Yearly No: EI81016502
Title: CLASS OF MATRIX METHODS FOR SURFACE **REPRESENTATION.**
Author: Jiachang, Sun
Corporate Source: Acad Sin, Comput Cent, Bejing, China
Source: CAD 80 Int Conf and Exhib on Comput in Des Eng, 4th, Brighton, Sussex, Engl, Mar 31-Apr 2 1980 Publ by IPC Sci and Technol Press, Guildford, Surrey, Engl, 1980 p 251-254
Publication Year: 1980
Language: ENGLISH
Journal Announcement: 8106
Abstract: A general approach to constructing **curves** and **surfaces** , according to a given polygon and polyhedron, respectively, is presented. The distribution of the related matrix elements for parametric polynomial **curves** and **surfaces** is investigated. Some criteria, such as consistency, convexity, symmetry and local dependence of the lower-order **derivative vector** at the end points of the **curves** (or **surfaces**), have been found. It is shown that the representation presented is a generalization of well-known **B -spline** and **Bezier curves -surfaces** . 3 refs.
Descriptors: *COMPUTER AIDED DESIGN
Classification Codes:
723 (Computer Software)
72 (COMPUTERS & DATA PROCESSING)

7/5/14 (Item 1 from file: 238)
DIALOG(R)File 238:Abs. in New Tech & Eng.

0265342 ANTE NUMBER: 9502281
Tessellating trimmed NURBS surfaces
AUTHOR(S): Piegl, L. A.; Richard, A. M.
JOURNAL: Computer Aided Design 27 (1) Jan 95 p.16-26. il.tables.refs.
PUBLICATION YEAR: 1995
ISSN: 0010-4485
BLDSC SHELF MARK: 3393.520
LANGUAGE: English

ABSTRACT: An algorithm for obtaining a piecewise planar approximation of a trimmed **NURBS surface** is presented. The algorithm triangulates the trimmed parametric region such that the triangles mapped onto the **surface** form a piecewise triangular approximation to within a user specified tolerance. The parameter space is not split into regions representing **Bezier** patches; rather it is triangulated as a whole. The number of triangles computed depends on the bounds of the second **derivatives** . A detailed discussion of the algorithm and a practical error analysis of the tessellation are provided. (Original abstract-amended)

DESCRIPTORS: Algorithms; Triangulation; Trimmed patches; **Nonuniform rational B spline** functions; Approximation; **Curved surfaces** ;

7/5/15 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abstracts Online

01609585 ORDER NO: AAD98-08196
MOTION SYNTHESIS FOR COMPUTER-AIDED GEOMETRIC DESIGN (RIGID BODY DISPLACEMENTS, PLANES, LINES)
Author: KANG, DONGLAI
Degree: PH.D.
Year: 1997
Corporate Source/Institution: STATE UNIVERSITY OF NEW YORK AT STONY BROOK (0771)
Adviser: Q. JEFFREY GE
Source: VOLUME 58/09-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 5070. 160 PAGES
Descriptors: ENGINEERING, MECHANICAL ; COMPUTER SCIENCE
Descriptor Codes: 0548; 0984

This thesis deals with parametrically defined geometric shapes such as **Bezier curves** and **surfaces** and parametrically defined Cartesian motions of a rigid body. The main purpose of this thesis is to extend the application domain of methods in the field of Computer Aided Geometric Design from the geometry of points to the geometries of planes, lines, and rigid body displacements. The thesis also seeks to develop methods for shape design from kinematics of rigid body motions.

Essential to the development of this thesis are the representations of planes, lines, and rigid-body displacements as points in the coordinate spaces of the respective geometric entities. The notion of projective space planes an important role in developing and utilizing these representations. The projective duality between points and planes is used to study the enveloping **surfaces** of one- and two-parameter family of planes. This leads to the development of developable rational **Bezier surfaces** and dual tensor-product **surfaces** . The representation of a line-segment in terms of Plucker line coordinates and Study's dual **vector** allows one to study the problem of designing ruled **surfaces** as a **curve** design problem in the space of line coordinates. The representation of a spatial rigid-body displacement in terms of dual-quaternion coordinates leads to two types of algorithms for spatial motion synthesis. One is developed by combining CAGD methods such as the deCastejau algorithm and geometric continuity with the geometry of a unit dual hypersphere. The other type of algorithm is obtained by applying projective algorithms in CAGD to the space of dual quaternions. This results in one-degree-of-freedom rational **Bezier** and **B -spline** motions as well as two-degree-of-freedom rational tensor-product **Bezier** motions. The rational **Bezier** and **B -spline** motions are then used to study the trajectories and enveloping **surfaces** of a moving object. This leads to the development of a special class of tensor-product **Bezier surfaces** as the enveloping **surfaces** of rational motions of planes and developable **surfaces** such as cylinders. The results have not only theoretical interest in CAGD and kinematics but also applications in CAD/CAM, Computer Graphics, and Robotics.

7/5/16 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abstracts Online

01571031 ORDER NO: AAD97-25305
THE DESIGN OF SMOOTH GENUS N OBJECTS AND ASSOCIATED FIELDS (SURFACE **MODELLING, INFINITE CONTINUITY, MULTIPERIODIC FUNCTION, SINGLE DOMAIN)**
Author: KIM, HWA-JIN PARK
Degree: PH.D.
Year: 1997
Corporate Source/Institution: ARIZONA STATE UNIVERSITY (0010)
Source: VOLUME 58/03-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1370. 101 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984

Recently, there have been some developments in constructing infinitely smooth genus n objects over a single domain using so called topological

design methods. Comparing with the existing geometric design methods, such as **B -spline** , **Bezier** , tensor product, it provides many advantages: simpler data structure, compact data set, and infinite continuity. Improvement in the user interface, however, is still needed for designing free-form genus n objects. This research improves the topological design interface by incorporating a radial basis scattered data interpolating function for designing infinitely smooth genus n objects over a single domain. As part of this research, a constrained Delaunay triangulation over the unstructured given data, on the single domain, is activated. This allows visualization of the polygonized genus n object in object space as well as providing an interactive data control behavior in object space. This method is characterized by the unconstrained control points inside boundaries and the small-size data set for designing a free form genus n object.

In addition, this research presents a scalar field and a **vector** field over the genus n object. Color transition is used to visualize the periodized offset from the original **surface** as an example of the scalar field, and bump mapping is employed to visualize the smoothly connected normal **vector** over the **surface** as an example of the **vector** field. Multiperiodizing the texture function gives the seamless texture mapping over the genus n object.

7/5/17 (Item 3 from file: 35)
DIALOG(R)File 35:Dissertation Abstracts Online

01354917 ORDER NO: AAD94-15375
SHAPING CURVED SURFACES **(BENDING OPERATOR)**
Author: RHOADES, JOHN SCOTT
Degree: PH.D.
Year: 1993
Corporate Source/Institution: THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL (0153)
Director: STEPHEN M. PIZER
Source: VOLUME 54/12-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 6310. 149 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984

This dissertation presents a new tool for shaping **curved surfaces** , the bending operator. The bending operator is an interactive tool intended for use in 3-D sketching. It is based on the idea that bending a **surface** is equivalent to changing its normal **vector** field while perturbing its metric as little as possible. The user of this tool specifies a bending operator, which is a **surface** that indicates how the normals of a target **surface** should change. The bending algorithm adds the **derivatives** of the normal **vector** fields of the bending and target **surfaces** and integrates this sum to produce a desired normal **vector** field. The target **surface** is then reshaped using a variational technique that moves the underlying **surface** control points to minimize a penalty function of the target **surface** . After bending, the resulting **surface** acquires the features of the bending **surface** while maintaining the general shape of the original target **surface** .

The bending algorithm can perform a wide variety of **surface** shaping tasks, including bending about a cylinder axis, indenting, **twisting** , and embossing. The algorithm includes a positioning control used to specify the correspondence between points of the bending operator **surface** and target **surface** and a range of action selector used to restrict the bending action to a part of the target **surface** . The bending operator is intuitive in that a user can easily learn to predict the approximate result of a bending operation without needing a detailed understanding of the algorithm. The algorithm can be applied to any patch type that is based on control points and that is piecewise twice differentiable, including **Bezier** patches, **B -spline** patches, and **NURBS** . The algorithm can also be applied to a non-branching mesh of patches with smoothness constraints. The bending algorithm was implemented in an interactive prototype program using X-windows. This program performs a bending operation in seconds to minutes

on a HP-730 workstation depending on the complexity of the target and bending **surfaces** . The dissertation also includes an **outline** for a joining algorithm based on variational techniques similar to those used in bending.

7/5/18 (Item 4 from file: 35)
DIALOG(R)File 35:Dissertation Abstracts Online

01302712 ORDER NO: AADMM-75800
SHAPE CONTROL FOR MULTIVARIATE B- SPLINE SURFACES **OVER ARBITRARY TRIANGULATIONS**
Author: FONG, PHILIP
Degree: M.MATH.
Year: 1992
Corporate Source/Institution: UNIVERSITY OF WATERLOO (CANADA) (1141)
Source: VOLUME 31/03 of MASTERS ABSTRACTS.
PAGE 1264. 107 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984
ISBN: 0-315-75800-7

Complicated smooth **surfaces** have been difficult to construct using present day techniques such as tensor-product **surfaces** and **Bezier** triangles. But, recently in (DMS90), a new multivariate **B -spline** scheme based on blending functions, control vertices and knots has been developed. The **surface** scheme allows $C\sp{n-1}$-continuous piecewise polynomial **surfaces** of degree n over arbitrary triangulations to be modelled. Actually, given an arbitrary triangulation, piecewise polynomial **surfaces** over a refined triangulation are produced. The scheme exhibits both affine invariance and the convex hull property, and the control points can be used to manipulate the shape of the **surface** locally. There are additional degrees of freedom associated with the knots which allow the **surface** to be further shaped.

This thesis describes a test implementation of the scheme for linear, quadratic and cubic **surfaces** . Issues such as evaluating points on the **surface** , evaluating directional **derivatives** on the **surface** and representing piecewise polynomial **surfaces** as linear combinations of **B -splines** will be discussed. Several examples illustrating the implementation and the properties of the new **surface** scheme will be shown. The work is incorporated into a **surface** editor which has been developed at the Computer Graphics Laboratory at the University of Waterloo.

7/5/19 (Item 1 from file: 202)
DIALOG(R)File 202:Information Science Abs.

00087612 8500910
ISA Document Number in Printed Publication: 8500910
A description and evaluation of various 3-D models.
Document Type: Journal Article
Author (Affiliation): Barsky, B.A. (University of California, Berkeley, CA)
Country of Affiliation: UNITED STATES
Journal: IEEE Computer Graphics and Applications
Publication Language(s): English
Source: Vol. 4 Issue 1 p. 38-52 Jan 1984 25 ref.

The use of straight line segments and planar polygons to approximate **curved** lines and **surfaces** has limited the advancement of computer graphics. Even with the most sophisticated continuous-shading models, polygonal techniques generally result in visually objectionable images. Mach bands are apparent at the borders between adjacent polygons, and there is always a telltale jagged polygonal silhouette. Also, polygonal methods often require excessive amounts of storage, and the storage resolution of a polygonal database

is fixed, independent of the eventual display, as opposed to **curved surface** techniques that allow the resulting image to be computed to whatever level of detail the situation demands. Early work by Coons and **Bezier** introduced the use of nonlinear parametric polynomial representations for the segments and patches stitched together to form piecewise **curves** and **surfaces** , establishing their viability. More recently Riesenfeld has advocated the use of **B -splines** to represent such polynomials on the grounds of greater flexibility and efficiency. Parametric **B -splines** have many advantages. Among them is the ability to control the degree of continuity at the joints between adjacent **curve** segments and at the borders between **surface** patches, independent of the order of the segments or the number of control vertices. However, the notion of parametric first- or second-degree continuity at joints does not always correspond to intuition or to a physically desired effect. For piecewise cubic **curves** and bicubic **surfaces** , these parametric continuity constraints can be replaced by the more meaningful requirements of continuous unit tangent and curvature **vectors** . Doing so introduces certain constrained discontinuities in the first and second parametric **derivatives** . These are expressed in terms of bias and tension parameters, called beta!! sub!! 1 and beta!! sub!! 2 , and give rise to Beta-spline **curves** and **surfaces** .

Descriptors: Three Dimensional; COMPUTER GRAPHICS; COMPUTING; GEOMETRY; IMAGES; MODELING; MODELS

Subject Class Header (Number):Information Processing and Control, Graphics and Displays (05.08)

7/5/20 (Item 1 from file: 2)

DIALOG(R)File 2:INSPEC

5573544 INSPEC Abstract Number: B9706-0290F-006, C9706-4130-015

Title: Matrix formulae for NURBS curves / surfaces **and their applications**

Author(s): Qin Kaihuai
Author Affiliation: Dept. of Comput. Sci. & Technol., Tsinghua Univ., Beijing, China

Journal: Chinese Journal of Computers vol.19, no.12 p.941-7
Publisher: Science Press,
Publication Date: Dec. 1996 Country of Publication: China
CODEN: JIXUDT ISSN: 0254-4164
SICI: 0254-4164(199612)19:12L.941:MFNC;1-Y
Material Identity Number: B714-97004
Language: Chinese Document Type: Journal Paper (JP)
Treatment: Theoretical (T)

Abstract: In this paper, the concept of basis matrix is presented, and recursive matrix formulae for **curves** and **surfaces** of **Bezier** , **NURBS** , uniform or nonuniform **B -splines** are proposed using the Toeplitz matrix. The formulae can be used for efficient computation of **derivatives** of **NURBS** **curves** and **surfaces** , degree raising or degree reduction of **B - spline** **curves** . The basis matrices have better time complexity than de Boor-Cox's recursive formula when used for conversion and computation of **B - spline** **curves** and **surfaces** between different CAD systems. A few examples are given in the paper. (9 Refs)

Descriptors: computational complexity; **curve** fitting; recursive functions; **surface** fitting; Toeplitz matrices

Identifiers: **NURBS** **curves** ; basis matrix; Toeplitz matrix; time complexity; **surfaces** ; recursive matrix formulae; **B -splines**

Class Codes: B0290F (Interpolation and function approximation); B0290H (Linear algebra); C4130 (Interpolation and function approximation); C4240C (Computational complexity); C4140 (Linear algebra)

7/5/21 (Item 2 from file: 2)

DIALOG(R)File 2:INSPEC

5125179 INSPEC Abstract Number: C9601-4260-041

Title: A general construction scheme for unit quaternion curves **with simple high order** derivatives

Author(s): Myoung-Jun Kim; Myung-Soo Kim; Sung Yong Shin
Author Affiliation: Korea Adv. Inst. of Sci. & Technol., Taejon, South Korea

Conference Title: Computer Graphics Proceedings. SIGGRAPH 95 p.369-76
Editor(s): Cook, R.
Publisher: ACM, New York, NY, USA
Publication Date: 1995 Country of Publication: USA 518 pp.
ISBN: 0 89791 701 4
U.S. Copyright Clearance Center Code: 0 89791 701 4/95/008.$3.50
Conference Title: Proceedings of SIGGRAPH '95
Conference Sponsor: ACM
Conference Date: 6-11 Aug. 1995 Conference Location: Los Angeles, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Theoretical (T)

Abstract: This paper proposes a new class of unit quaternion **curves** in SO(3). A general method is developed that transforms a **curve** in R/sup 3/ (defined as a weighted sum of basis functions) into its unit quaternion analogue in SO(3). Applying the method to well-known spline **curves** (such as **Bezier** , Hermite, and **B -spline** **curves**), we are able to construct various unit quaternion **curves** which share many important differential properties with their original **curves** . Many of our naive common beliefs in geometry break down even in the simple non-Euclidean space S/sup 3/ or SO(3). For example, the de Casteljau type construction of cubic **B -spline** quaternion **curves** does not preserve C/sup 2/-continuity. Through the use of decomposition into simple primitive quaternion **curves** , our quaternion **curves** preserve most of the algebraic and differential properties of the original spline **curves** . (20 Refs)

Descriptors: computational geometry; splines (mathematics)
Identifiers: computational geometry; construction scheme; unit quaternion **curves** ; simple high order **derivatives** ; spline **curves** ; de Casteljau type construction
Class Codes: C4260 (Computational geometry); C4130 (Interpolation and function approximation)

7/5/22 (Item 3 from file: 2)

DIALOG(R)File 2:INSPEC

5037923 INSPEC Abstract Number: C9510-6130B-083

Title: C/sup 1/- surface **splines**

Author(s): Peters, J.
Author Affiliation: Dept. of Comput. Sci., Purdue Univ., West Lafayette, IN, USA

Journal: SIAM Journal on Numerical Analysis vol.32, no.2 p.645-66
Publication Date: April 1995 Country of Publication: USA
CODEN: SJNAEQ ISSN: 0036-1429
U.S. Copyright Clearance Center Code: 0036-1429/95/$1.50+0.10
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T)

Abstract: The construction of quadratic C/sup 1/ **surfaces** from **B - spline** control points is generalized to a wider class of control meshes capable of outlining arbitrary free-form **surfaces** in space. Irregular meshes with nonquadrilateral cells and more or less than four cells meeting at a point are allowed so that arbitrary free-form **surfaces** with or without boundary can be modeled in the same conceptual frame work as tensor-product **B - splines** . That is, the mesh points serve as control points of a smooth piecewise polynomial **surface** representation that is local, evaluates by averaging, and obeys the convex hull property. For a regular region of the input mesh, the representation reduces to the standard quadratic spline. In general, a **surface** spline is represented by Bernstein- **Bezier** patches of degree two and three with **derivatives**

matching across boundaries after local reparametrization. According to the user's choice, these patches can be polynomial or rational, and three-sided, four-sided, or a combination thereof. (33 Refs)

Descriptors: computational geometry; solid modelling; splines (mathematics)

Identifiers: C/sup 1/-**surface** splines; quadratic C/sup 1/ **surfaces** ; B -**spline** control points; control meshes; arbitrary free-form **surfaces** ; irregular meshes; tensor-product **B -splines** ; convex hull property; Bernstein-**Bezier** patches; local reparametrization

Class Codes: C6130B (Graphics techniques); C4130 (Interpolation and function approximation); C4260 (Computational geometry)

7/5/23 (Item 4 from file: 2)

DIALOG(R)File 2:INSPEC

4960327 INSPEC Abstract Number: C9507-6130B-023

Title: A study on the high speed curve **generator using 1-dimensional systolic array processor**

Author(s): Yong Sung Kim; Won Kyung Cho

Author Affiliation: Dept. of Electr. Eng., Kyunghee Univ., South Korea

Journal: Journal of the Korean Institute of Telematics and Electronics vol.31B, no.5 p.1-11

Publication Date: May 1994 Country of Publication: South Korea

CODEN: CKNOEZ ISSN: 1016-135X

Language: Korean Document Type: Journal Paper (JP)

Treatment: Practical (P)

Abstract: In computer graphics, since objects are constructed by lines and **curves** , the high-speed **curve** generator is indispensible for computer aided design and simulation. Since the functions of graphic generation can be represented as a series of matrix operations, two kinds of high-speed **Bezier** **curve** generator that use matrix equation and a recursive relation for **Bezier** polynomials are designed. Also, a **B - spline** **curve** generator is designed using interdependence of **B -spline** blending functions. The designed **curve** generator with 1-dimensional systolic array processor for matrix **vector** operation is found to be more effective than previously designed **curve** generators. (11 Refs)

Descriptors: computer graphics; **curve** fitting; pipeline processing; polynomial matrices; splines (mathematics); systolic arrays

Identifiers: high speed **curve** generator; 1-dimensional; systolic array processor; computer graphics; graphic generation; matrix operations; **Bezier** **curve** generator; recursive relation; **Bezier** polynomials; **B - spline** **curve** generator

Class Codes: C6130B (Graphics techniques); C5220P (Parallel architecture) ; C4130 (Interpolation and function approximation)

7/5/24 (Item 5 from file: 2)

DIALOG(R)File 2:INSPEC

4768435 INSPEC Abstract Number: C9411-4260-016

Title: Ray tracing general parametric surfaces **using interval arithmetic**

Author(s): Barth, W.; Lieger, R.; Schindler, M.

Author Affiliation: Dept. of Comput. Graphics, Tech. Univ. Wien, Austria

Journal: Visual Computer vol.10, no.7 p.363-71

Publication Date: 1994 Country of Publication: West Germany

CODEN: VICOE5 ISSN: 0178-2789

Language: English Document Type: Journal Paper (JP)

Treatment: Practical (P); Theoretical (T)

Abstract: This paper describes an algorithm for ray tracing general parametric **surfaces** . After dividing the **surface** adaptively into small parts, a binary tree of these parts is built. For each part a bounding volume is calculated with interval arithmetic. From linear approximations and intervals for the partial **derivatives** it is possible to construct

parallelepipeds that adapt the orientation and shape of the **surface** parts very well and form very tight enclosures. Therefore we can develop an algorithm for rendering that is similar to that used with **Bezier** and **B - spline surfaces** , where the bounding volumes are derived from the convex hull property. The tree of enclosures (generated once in a preprocessing step) guarantees that each ray that hits the **surface** leads to an iteration on a very small **surface** part; this iteration can be robustly (and very quickly) performed in real arithmetic. (20 Refs)
Descriptors: colour; computational geometry; ray tracing; rendering (computer graphics); trees (mathematics)
Identifiers: ray tracing; general parametric **surfaces** ; interval arithmetic; binary tree; bounding volume; parallelepipeds; **surface** parts; rendering; convex hull property
Class Codes: C4260 (Computational geometry); C1160 (Combinatorial mathematics); C6130B (Graphics techniques)

7/5/25 (Item 6 from file: 2)
DIALOG(R)File 2:INSPEC

4499811 INSPEC Abstract Number: B9311-0290F-011, C9311-4130-020
Title: Energy and error function minimisation for computation of optimal shape parameters
Author(s): Gopalsamy, S.; Reddy, T.S.
Author Affiliation: Div. of Graphics & CAD, Nat. Centre for Software Technol., Bombay, India
Journal: Computers & Graphics vol.17, no.4 p.403-5
Publication Date: July-Aug. 1993 Country of Publication: UK
CODEN: COGRD2 ISSN: 0097-8493
U.S. Copyright Clearance Center Code: 0097-8493/93/$6.00+.00
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T)
Abstract: In interpolation and **curve** -fitting problems where one has to obtain **curves** having specified tangent directions and curvature values, one has to choose magnitudes of tangents and magnitudes of tangent components of second **derivative vectors** . The shape of an interpolated **curve** and the deviation of a fitted **curve** are significantly affected by the choice of these shape parameters. The authors derive energy and error functions in terms of the shape parameters, which when minimised result in optimal shape parameters, characterising the fairness and minimum deviation, respectively. (6 Refs)
Descriptors: computational geometry; **curve** fitting; interpolation; minimisation
Identifiers: error function minimisation; energy minimisation; optimal shape parameters; interpolation; **curve** -fitting; second **derivative vectors** .; **curve** design; **B -spline** ; **Bezier curve**
Class Codes: C4130 (Interpolation and function approximation); B0290F (Interpolation and function approximation); C4260 (Computational geometry); C1180 (Optimisation techniques); B0260 (Optimisation techniques)

7/5/26 (Item 7 from file: 2)
DIALOG(R)File 2:INSPEC

02666398 INSPEC Abstract Number: C86031314
Title: The state of the art in modelling systems
Author(s): Rowley, T.
Author Affiliation: Kinlex Ltd., Nuneaton, UK
Book Title: Computer-aided design and manufacture. State of the art report p.61-9
Editor(s): Scrivener, S.A.R.
Publisher: Pergamon Infotech, Maidenhead, Berks., UK
Publication Date: 1985 Country of Publication: UK xi+237 pp.
Language: English Document Type: Book Chapter (BC)
Treatment: Practical (P)
Abstract: Modelling systems have been developed to meet the requirements

of different CAD/CAM applications. These models may be linear for simple structures or planar polygons for **surface** representations, **curved surfaces** , volumes coding or divided and discontinuous **surfaces** . These requirements are handled with **vectors** , polygons, Coons and **Bezier** patches, **B - splines** , beta-splines, primitive volumes, octrees, fractals, graftals and particle systems. The characteristics of these techniques are briefly reviewed so that their usefulness for a particular application can be assessed. (0 Refs)
Descriptors: CAD/CAM; computational geometry; splines (mathematics)
Identifiers: modelling systems; CAD/CAM; planar polygons; **surface** representations; **curved surfaces** ; volumes coding; discontinuous **surfaces** ; **vectors** ; Coons; **Bezier** patches; **B -splines** ; beta-splines; primitive volumes; octrees; fractals; graftals; particle systems
Class Codes: C6130B (Graphics techniques); C7400 (Engineering)

7/5/27 (Item 8 from file: 2)
DIALOG(R)File 2:INSPEC

01832972 INSPEC Abstract Number: B82019287, C82014723
Title: The shape control of the parametric cubic curve **segment and the** Bezier **cubic** curve
Author(s): Liu Ting-yuan
Author Affiliation: Inst. for Math., Fudan Univ., China
Journal: Acta Mathematicae Applacatae Sinica vol.4, no.2 p.158-65
Publication Date: 1981 Country of Publication: China
CODEN: YYSPDS ISSN: 0254-3079
Language: Chinese Document Type: Journal Paper (JP)
Treatment: Theoretical (T)
Abstract: The parametric cubic **curve** segment and the cubic **Bezier curve** are most frequently used **curve** segments in computational geometry. If the two tangent **vectors** at the end points are given, the cubic parametric **curve** segment is determined uniquely. The author makes use of the pair of affine invariants lambda and mu , the relative lengths of the tangent **vectors** at the end points, to control the shape of the parametric cubic **curve** segment. As an example, the problem of the shape control of the cubic **Bezier curve** is discussed. This method can be applied to the cubic **B spline curve** as well. (12 Refs)
Descriptors: splines (mathematics)
Identifiers: shape control; parametric cubic **curve** segment; **Bezier** cubic **curve** ; computational geometry; cubic **B -spline**
Class Codes: B0290F (Interpolation and function approximation); C4130 (Interpolation and function approximation)

7/5/28 (Item 1 from file: 233)
DIALOG(R)File 233:Microcomputer Abstracts

00426881 96MA06-201
Fractal app will cross vectors, **natural media**
Gulick, Rebecca
MacWEEK , June 17, 1996 , v10 n24 p1, 72, 2 Page(s)
ISSN: 0892-8118
Company Name: Fractal Design
Product Name: Expression
Languages: English
Document Type: Product Announcement
Hardware/Software Compatibility: Macintosh; IBM PC Compatible
Geographic Location: United States
Announces the availability of Expression ($449), a graphics application for the Macintosh and Windows-based PCs from Fractal Design Corp. of Aptos, CA (800, 408). Says it merges natural media technology with **vector** -based drawing capabilities developed by Ray Dream Inc. of Mountain View, CA. Adds that it offers the ability to layer and stretch transparent strokes with the width and **skew** of these strokes varying according to the pressure applied to a tablet, **Bezier** -creation tools, and support for a variety of

formats. Also says it will include a freehand drawing pen, a **Bezier** pen, and **B spline** tools. Includes a screen display. (dpm)
Descriptors: Graphics; Macintosh; Window Software
Identifiers: Expression; Fractal Design

7/5/29 (Item 1 from file: 6)
DIALOG(R)File 6:NTIS

0348923 NTIS Accession Number: AD-750 743/XAB
Geometric Concepts for Computer Graphics
(Final rept. 1 Sep 71-31 Aug 72)
Adams, J. A.
Naval Academy Annapolis Md Div of Engineering and Weapons
Corp. Source Codes: 406923
Report No.: EW-72-4
Sep 72 236p
Journal Announcement: GRAI7224
Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)321-8547; and email at orders@ntis.fedworld.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
NTIS Prices: PC A11/MF A01
Contract No.: NAVSHIPS-14-532-104; 14497
The report presents a discussion of existing techniques for representing points, lines, **curves** , and **surfaces** within a digital computer, as well as computer software procedures for manipulating and displaying computer output in graphical form. Mathematical techniques for producing axonometric and perspective views are given along with generalized techniques for rotation, translation, and scaling of geometric figures. **Curve** definition procedures for both explicit and parametric representation are presented for both 2-D and 3-D **curves** . **Curve** definition techniques include the use of conic sections, circular arc interpolation, cubic splines, parabolic blending, **Bezier curves** , and (RB sup 3) **curves** based upon **B - splines** . (Author)
Descriptors: Programming(Computers); Graphics; Matrix algebra; Transformations(Mathematics); **Vector** analysis; Tensor analysis; Interpolation; Integrals; Integration; **Curve** fitting; Plotters
Identifiers: *Computer graphics; Spline interpolation; NTISN
Section Headings: 62B (Computers, Control, and Information Theory--Computer Software)

7/5/30 (Item 1 from file: 144)
DIALOG(R)File 144:Pascal

12915317 PASCAL No.: 97-0183625
Definition, proprietes et utilisation d'une base duale des fonctions de Bezier
(Definition, properties and the using of a dual base of Bezier's **functions)**
GERMAIN-LACOUR P
PSA Peugeot Citroen/DTII, France; AF MICADO, France
Journal: Revue internationale de CFAO et d'informatique graphique, 1996 , 11 (6) 675-691
ISSN: 1266-0175 Availability: INIST-21639; 354000063274320050
Document Type: P (Serial) ; A (Analytic)
Country of Publication: France
Language: French

English Descriptors: Image processing; Graphics; **Curve** ; **Surface** ; Modeling; Analytic geometry; **Vector** calculus; Matrix calculus; **Bezier curve** ; Bernstein polynomial

French Descriptors: Traitement image; Representation graphique; Courbe; **Surface** ; Modelisation; Geometrie analytique; Calcul **vectoriel** ; Calcul

matriciel; Courbe **Bezier** ; Polynome Bernstein; Base orthonormee; Base duale; Courbe **BSPLINE** ; Courbe **NURBS**

Classification Codes: 001D02C03; 001D02A05

7/5/31 (Item 2 from file: 144)
DIALOG(R)File 144:Pascal

12860795 PASCAL No.: 97-0119491
Simple technique for NURBS **shape modification**
SANCHEZ REYES J
Polytechnic Univ of Catalonia, Catalonia, Spain
Journal: IEEE Computer Graphics and Applications, 1997, 17 (1) 52-59
ISSN: 0272-1716 CODEN: ICGADZ Availability: INIST-222 W
No. of Refs.: 10 Refs.
Document Type: P (Serial) ; A (Analytic)
Country of Publication: United States
Language: English
A unified method is presented for modifying **non -uniform rational B - splines** . The method consists of a perspective functional transformation of arbitrary origin O. The user input for this modification amounts only to choosing O and displacing a control point along the radial direction through O. As this **NURBS** shape manipulation admits a geometric interpretation, the choice of O influences in a predictable way how a given displacement of the control point influences the final shape. The concept can be applied to any rational formulation.

English Descriptors: **Nonuniform rational B spline** ; Shape modification; Perspective functional transformation; Polygon; Computer aided geometric design; **Bezier curves** ; Rational basis function; **Curve** manipulation; Euclidean control points; Rational linear reparametrization; Application; Computational geometry; Computer aided design; **Curve** fitting; Mathematical transformations; Functions; Polynomials; Three dimensional computer graphics; Interactive computer graphics; Invariance; Constraint theory; **Vectors** ; Computer graphics; Theory

French Descriptors: Application; Geometrie algorithmique; Conception assistee; Ajustement courbe; Transformation mathematique; Fonction mathematique; Polynome; Infographie tridimensionnelle; Infographie interactive; Invariance; Theorie contrainte; Vecteur; Infographie; Theorie

Classification Codes: 001D02B12; 001A02B; 001A02I01; 001A02E; 001A02D; 001D02A

7/5/32 (Item 3 from file: 144)
DIALOG(R)File 144:Pascal

12423378 PASCAL No.: 96-0078370
A note on degenerate normal vectors
DANIEL M
Institut de Recherche en Informatique de Nantes, Ecole Centrale de Nantes, 1 rue de la Noe, 44072 Nantes Cedex 03, France
Journal: Computer aided geometric design, 1995, 12 (8) 857-860
ISSN: 0167-8396 CODEN: CAGDEX Availability: INIST-20700
Document Type: P (Serial) ; A (Analytic)
Country of Publication: Netherlands
Language: English Summary Language: English
 In (Kim and

Papalambros, 1995), the detection of potential degenerate normal **vectors** is studied. The associated criterion (2.1) may fail as illustrated with a counterexample. Additional results on degenerate normal **vectors** are proposed.

English Descriptors: Computational geometry; Normal form; Tangential discontinuity; **B spline** ; **Bezier curve** ; Computer aided design

French Descriptors: Geometrie algorithmique; Forme normale; Discontinuite tangentielle; **B spline** ; Courbe **Bezier** ; Conception assistee; Tangent and normal cones; Degenerate normal **vectors**

Classification Codes: 001D02C03; 001D02B11

7/5/33 (Item 1 from file: 99)
DIALOG(R)File 99:Wilson Appl. Sci & Tech Abs

1229276 H.W. WILSON RECORD NUMBER: BAST95024849
C1- surface **splines**
Peters, Jorg;
SIAM Journal on Numerical Analysis v. 32 (Apr. '95) p. 645-66
DOCUMENT TYPE: Feature Article ISSN: 0036-1429 LANGUAGE: English
RECORD STATUS: New record

ABSTRACT: A report on a generalization of the construction of quadratic C1 **surfaces** from **B -spline** control points to a wider class of control meshes that can **outline** arbitrary free-form **surfaces** in space. The tensor product **B -spline** representation has the major limitation that it cannot model certain real-world objects without singularity in the parameterization. In the proposed generalization, the mesh points serve as control points of a smooth piecewise polynomial **surface** representation that is local, evaluates by averaging, and obeys the convex hull property. For a regular region of the input mesh, this representation reduces to the standard quadratic spline. Generally, a **surface** spline is represented by Bernstein-**Bezier** patches of degree 2 and 3, with **derivatives** matching across boundaries after local reparameterization. The user can choose these patches to be polynomial or rational and to be 3-sided, 4-sided, or a combination.
DESCRIPTORS: Spline functions; Computational grids; Computer graphics-- **Surface** and contour representation;

Set	Items	Description
S1	2764	NURBS OR (NONUNIFORM OR NON()UNIFORM)()RATIONAL OR B()SPLI-NE? OR BSPLINE?
S2	236	S1 (S) (VECTOR? OR DERIVATIVE?)
S3	37	S2 AND BEZIER?
S4	27	S3 (S) (CURVE? OR SURFACE? OR ROUNDED OR OUTLINE? OR CROOK-ED OR UNEVEN OR BENT OR WARPED OR SKEW? OR TWIST?)
S5	15	S4 (S) (PIPE? OR RENDER? OR MODEL? OR REPRESENTAT? OR CAD)
S6	26	RD S4 (unique items)
S7	26	S6 NOT PY>1997
S8	24	S7 NOT PD>970425

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File 239:Mathsci(R) 1940-1999/Feb
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File 696:DIALOG Telecom. Newsletters 1995-1999/Mar 02
(c) 1999 The Dialog Corp.

File 553:Wilson Bus. Abs. FullText 1982-1999/Jan
(c) 1999 The HW Wilson Co

8/3,K/1 (Item 1 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01959055 SUPPLIER NUMBER: 18457059 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Fractal brings natural expression to vector art. (Fractal Design's Expression vector-based illustration program)(Brief Article)(Product Announcement)
Seybold Report on Desktop Publishing, v10, n11, p22(1)
July 8, 1996
DOCUMENT TYPE: Brief Article Product Announcement ISSN: 0889-9762
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 880 LINE COUNT: 00074

... with which the shape and direction of objects may be changed that sets Expression apart. **Bezier** handles aren't used in the application, although **Bezier curve** technology may underlie a drawing. Illustrators can simply drag elements of drawings and see them move in the direction they are pulled, instead of seeing them follow hidden **Bezier** contours. Nevertheless, a full complement of familiar **Bezier** drawing and editing tools are provided to make it easier to move back and forth between Expression and other **vector** drawing programs.

Another innovative distinction is Expression's support for pressure-sensitive styluses and tablets...

8/3,K/2 (Item 2 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01631490 SUPPLIER NUMBER: 14636021 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Evaluating 3D on the high end: a hands-on comparison of state-of-the-art software for 3D graphics and animation. (Software Review) (three-dimensional; ElectroGIG USA Inc.'s GIG 3DGO, Vertigo Technology Inc.'s Vertigo 9.5 and Wavefront Technologies Inc.'s Advanced Visualizer 3.0.1) (Evaluation)
Forcade, Tim
Computer Graphics World, v16, n11, p57(8)
Nov, 1993
DOCUMENT TYPE: Evaluation ISSN: 0271-4159 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4262 LINE COUNT: 00357

... solids modeling, materials creation and editing, raytracing, and keyframe animation. Additional modules are available for **NURBS** modeling, (Nurbsmodeler), iso-**surface** modeling (Sculptor), **vector** -field animation (Flowmotion), image-map creation (Mapfactory), textural raytracing (Raysketcher); there are also various conversion...along with a column of menu buttons specific to the process. Support for cardinal and **Bezier curves** , circles and arcs, and point editing is provided. Additional Model functions include Boolean equations as well as numerous deformation, such as **skew** , **twist** , taper, and bend.

A distinguishing characteristic of Model (and Preview as well) is it "a...

8/3,K/3 (Item 3 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01556501 SUPPLIER NUMBER: 14375355 (USE FORMAT 7 OR 9 FOR FULL TEXT)
A job well done. (Ultracam's CAD/CAM software Camax) (Software Review) (Evaluation)
Clarke, Charles
Cadcam, v11, n10, p33(3)
Nov, 1992
DOCUMENT TYPE: Evaluation ISSN: 0963-5750 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 2086 LINE COUNT: 00163

... surfacing facilities and tools is equally limited.
Conventional design systems usually come with around six **curve** types, ranging from continuous second **derivative** splines, through **Bezier** to **NURBS** . Ultracam's **curve** generation is disappointing, as the only **curve** provided is the **B -spline** . This is a rich **curve** type, but you need to have a detailed knowledge of its characteristics to use it...

8/3,K/4 (Item 4 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01549643 SUPPLIER NUMBER: 13038989 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Derivation of basis matrix. (Special Supplement on C++ programming)(parametrics and computer graphics) (Tutorial)
Johnson, Stephen P.; McReynolds, Tom
Dr. Dobb's Journal, v17, n12, pS58(1)
Dec, 1992
DOCUMENT TYPE: Tutorial ISSN: 1044-789X LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 882 LINE COUNT: 00066

... Note that t ranges from 0-1 in each curve segment.
Moving to order-four **curves** gives us two more levels of continuity to work with, allowing **curve** segments to be connected together smoothly. The equation for fourth-order parametric **curves** changes surprisingly little; see Example 1(h). Different **curves** are formed by defining the basis and geometry matrices. The basis matrix defines how the...

...the type of geometry in the geometry matrix. The basis and geometry matrices for Hermite, **Bezier** , **B -spline** , and Catmull-Rom .(an interpolating spline) are given in Example 1(i). A P in the geometry matrix indicates a control point, an R indicates a control **vector** .
The first three equations in Example 1(i) approximate the curves' control points; the Catmull...

8/3,K/5 (Item 5 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01549642 SUPPLIER NUMBER: 13038987 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Implementing curves in C++: computer graphics benefit from class libraries. (Special Supplement on C++ programming) (Tutorial)
Johnson, Stephen P.; McReynolds, Tom
Dr. Dobb's Journal, v17, n12, pS53(11)
Dec, 1992
DOCUMENT TYPE: Tutorial ISSN: 1044-789X LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 1958 LINE COUNT: 00158

...ABSTRACT: in C++, the base class is derived into two primary subclasses: basis matrix and nonuniform **B -spline** . The control points that define the **curve** shape must be supplied by the application that creates a **curve** object, and in some cases must also define the known **vector** , tension and bias values. The source file is provided that defines the Borland C++ specific...
Parametric **curve** types are distinguished by the type of control geometry describing the **curve** , and how it is used to generate the **curve** equation. A different **curve** type, even if it uses the same control geometry, will be interpreted into a different **curve** shape. The computer-graphics community makes use of a variety of **curve** types, trading off their different strengths and weaknesses. For example, a fast and simple **Bezier** **curve** may be ideal for representing fonts in a PostScript printer, while a more expressive NURBS **curve** would better represent the complex shapes created with a solids modeling application. As

a result, a sophisticated application may have to handle many different **curve** representations. In this article, we show how to represent a wide variety of **curve** representations efficiently, implementing them in C++, using a class hierarchy and an object-oriented programming...

...the parametric variable t.

Listing One (page 60) shows the C++ header file for the **curve** -class hierarchy. The Basis...

...**curve** class is used for the uniform beta-spline and to be derive the **curve** types Hermite, **Bezier** , uniform **B -spline** , and Catmull-Rom interpolating **curve** . The Nub...

...**curve** class defines the nonuniform, nonrational **B -splines** and to derive the **curve** type **nonuniform , rational B -spline** (commonly known as **NURBS**). Nonuniform **B -splines** require an extra piece of data called the "knot **vector** ," a floating-point array containing a nondecreasing list of values that control how the **curve** is evaluated. Figure 2 shows the formulas used to define nonuniform **B -splines** .

The implementation of curves involves defining the methods that use the control points to render**Bezier** , uniform B-spline, and Catmull-Rom spline, the constructor defines the basis matrix used to...

...basis matrix equivalent to the uniform B-spline. You can exert precise control of the **curve** by modifying the bias and tension parameters of the uniform beta-spline. Listing Two (page 60) shows the methods, including the constructors, for each of the various **curves** .

When an application creates a curve object, it must supply the control points that define...

...method renders a third-degree polynomial by tessellating it into vectors. But for a nonuniform **B -spline** class, the display...

...**curve** method is overwritten to display the **curve** , using the formulas in Figure 3.

Performance Comparison of Display Methods

For the Basis...

...at the first and last control points, and modifying the vectors' magnitude and direction.

A **Bezier curve** is rendered for the control points (20,20), (50,100), (300,50), and (100,10). This defines a simple **Bezier** -style **curve** . Immediately after rendering the **Bezier curve** , a non-uniform, nonrational **B -spline** (NUB) is rendered. The knot **vector** of this **curve** is set to (0, ...1). This interpolates the endpoints and extrapolates the interior control points, thus displaying the same **Bezier curve** . The knot **vector** of the NUB **curve** is then modified to (0,0,0,1,2,3,3,3) and rendered. This **curve** shows the extrapolation of the control points. A simple modification to the knot **vector** yields a completely different **curve** .

The next curve displayed is a Catmull-Rom curve which interpolates the control points. It...

?

8/3,K/6 (Item 6 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01488040 SUPPLIER NUMBER: 12735841
From Conics to NURBS: a tutorial and survey. (Technical)
Farin, Gerald
IEEE Computer Graphics and Applications, v12, n5, p78(9)
Sept, 1992
DOCUMENT TYPE: Technical ISSN: 0272-1716 LANGUAGE: ENGLISH
RECORD TYPE: ABSTRACT

ABSTRACT: **Nonuniform rational B -splines** (**NURBS**) are invariably considered the most promising **curve** or **surface** form. Detailed is the main geometric features of the **curve** . Most of them are already exhibited

in a special case of **NURBS** , called conics. Areas discussed include weight point, reparameterization, **derivatives** , curvature and G (squared) continuity, and control **vectors** . Rational **Bezier** **curves** are also looked at, along with cubic NURB **curves** , geometric rational splines, and rational **Bezier** and **B -spline** **surfaces** . Rational **Bezier** triangles and **derivatives** of those triangles, along with spheres and quadrics are also considered.

8/3,K/7 (Item 7 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01463875 SUPPLIER NUMBER: 11575964 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Taming CAD: is Windows up to it? Microsoft's toughest challenge yet. (computer-aided design, Windows 3.0) (Software Review) (Evaluation)
Markowitz, Mike
Computer Shopper, v11, n12, p263(4)
Dec, 1991
DOCUMENT TYPE: Evaluation ISSN: 0886-0556 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 3189 LINE COUNT: 00254

... dimensions and coordinates. There are keyboard shortcuts for selecting most tools and commands.

Vellum draws **curves** as **non -uniform** **rational** **B -splines** (**NURBs**), which are a superset of the **Bezier** **curves** used by many other drawing programs. You can force a **curve** to pass through the points you click (through-points spline) or click in points to determine **vectors** that control the **curve** (**vector** spline).

Vellum provides a tear-off palette of dimensioning tools, with many options, because the...

8/3,K/8 (Item 8 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01408825 SUPPLIER NUMBER: 09831201
On NURBS: a survey. (technical)
Piegl, Les
IEEE Computer Graphics and Applications, v11, n1, p55(17)
Jan, 1991
DOCUMENT TYPE: technical ISSN: 0272-1716 LANGUAGE: ENGLISH
RECORD TYPE: ABSTRACT

ABSTRACT: Rational and **B -splines** are the two major ingredients of **NURBS** , a widely accepted standard tool for geometry representation and design. Reasons for this acceptance are...

...offer a common mathematical form to represent and design standard analytic shapes and free-form **curves** and **surfaces** ; flexibility to design a wide variety of shapes; fast and computationally stable evaluation; clear geometric...

...invariance under scaling, rotation, translation, shear, and parallel and perspective projection; genuine generalizations of nonrational **B -spline** forms as well as rational and nonrational **Bezier** **curves** and **surfaces** . Shapes can be modified several ways with the definition of **NURBS** : by repositioning control points, changing the weights, modifying the knot **vector** , or moving data points and reinterpolating.

8/3,K/9 (Item 9 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01311338 SUPPLIER NUMBER: 07742012 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Why you'll need nurbs of steel. (B-spline geometry) (column)
Pipes, Alan
3D, n15, p13(1)
July, 1989
DOCUMENT TYPE: column ISSN: 0953-2331 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 1421 LINE COUNT: 00110

...ABSTRACT: usefulness must be seen in careful context. NURBS offers great flexibility in defining and tweaking **curves** and complex **surfaces** . Parametric cubic segments are a type of **curve** commonly used in CAD/CAM, requiring cartesian coordinates expressed in terms of a parameter. Spline routines, found in most CAD systems, automate **curve** definition but do not allow tight modifications. Some systems use higher-order **Bezier** **curves** , in which the designer specifies points and the program generates a **curve** passing through them. AutoCad 10.0 has quadric and cubic B-splines **curves** ; Autodesk Inc plans to put NURBS in its Autosolid program, and the workstation version of...
... they demanded software that dealt with parametric spaces and defined totally and accurately complex doubly-**curved** **surfaces** . Strangely enough, the problems associated with **surfaces** were tackled before simple 2D **curves** in the work of Steven Coons in the US and Pierre **Bezier** at Renault in France.

Complex surfaces are important to the designer for two different reasons...

...not to alter the general continuity.

The parametric cubic segment is the most commonly used **curve** in CAD/CAM. This requires the cartesian coordinates x,y,z to be expressed in ...

...coordinates vary as polynomials of t, in this case containing a term of t3. The **Bezier** form is defined in terms of four points: a start point, an end point, and...

...points is critical: the further they are moved along the tangent line, the more highly **curved** the segment.

The designer starts with an initial first guess -- say placing the tangent point...
...disturbing effects of localised changes are restricted to around four segments at most.

Higher order **Bezier** **curves** are often offered as an alternative form in some CAD/CAM systems. The designer specifies the points and the program generates a **curve** passing through them. Subsequently, the designer works directly with the vertices of the **Bezier** polygon with direct and total control of the definition, but without the ability to make ...

...got it, you will find no end of uses for it.'

RoboCAD 4 has cubic **Bezier** **curves** interpolated about four points, B-splines about any number of points and something called a Q-spline that automatically constructs a smooth **curve** through any number of user-defined points.

The rational cubic is a versatile form and...It can already take nurbs models down from its bigger brother, the workstation-based EMS.

Nurbs are already present in the workstation version of Anvil-5000, and the PC will then have an impressive array of surfacing tools. The basic package can handle ruled **surfaces** , **surfaces** of revolution, toruses, spheres, cylinders and 'developable' **surfaces** . The extended **surfaces** module will comprise Coons blended, **twist** **vector** , Coons patches, fillet **surfaces** , trimmable composite **surfaces** , and **curve** -driven **surfaces** (from a square to a circle, for example). The extra **nurbs** module will have full **nurbs** splines, **curve** editing and **nurbs** **surfaces** .

'Nurbs come into their own,' says MCS's Alan Morgan, 'when a precise shape is...

...one.'

Nurbs can be trimmed to arbitrary boundaries, and have most modest

database requirements. Large **curves** , such as an entire auto body panel, can be modelled with single, low-degree entities...

...and offsetting are faster and more stable, and nurbs are very good for fitting fair **curves** through large numbers of points even when the points are unevenly spaced. Plus, nurbs geometry can exactly represent points, arcs, conics, **Bezier** **curves** and uniform B-spline **curves** without approximation, for better geometry transfer between different makes of system.

8/3,K/10 (Item 10 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01300570 SUPPLIER NUMBER: 07333228 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The material world. (Ormus CAD system for textile industry - includes related article on Ormus in use)
Bickel, Stewart
3D, n13, p17(4)
May, 1989
ISSN: 0953-2331 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2455 LINE COUNT: 00184

...ABSTRACT: for vendors to develop affordable CAD tools for the clothing industry. Ormus combines B-spline, **Bezier** , and custom-designed **vector** **curves** to model the way clothing designers draw around objects and join **curves** to lines. It is based on an 80286 or 80386 microcomputer with a VGA, EGA or Hercules graphics card, **vector** -drawing software, and other programs for patterning and grading. Prices range from 9,000 pounds...
... required a lot more thought. I found that the way clothing designers want to join **curves** to lines or draw around objects had to be approached rather differently to the scaling...

...package. I had to throw away a lot of mathematical ideas about the purity of **curves** , and change algorithms to get what looked right. **Curves** ended up part B-spline, part **Bezier** and part some of my own stuff to get them to pass through the correct...

8/3,K/11 (Item 11 from file: 275)
DIALOG(R)File 275:IAC(SM) Computer Database(TM)

01185420 SUPPLIER NUMBER: 06066248
The conic curve: cubic splines can't match a method based on a more natural form.
Villalobos, Luis
Computer Graphics World, v10, n5, p91(3)
May, 1987
ISSN: 0271-4159 LANGUAGE: ENGLISH RECORD TYPE: ABSTRACT

ABSTRACT: The C, or conographic, **curve** is offered as a more accurate and efficient alternative especially than the cubic spline especially for type fonts. It overcomes the inherent limitations of the **B -spline** and **Bezier** forms by packing more constraints into less data. **Vector** approximations depend on the resolution of the device, so when a **vector** approximation is scaled up n times, then n times more resolution is needed. The following criteria would have to be met to surpass cubic splines and **vector** approximations: computational practicality and efficiency; universality; and mathematical robustness. Starting with some form of conic ...

...by area) proved a successful approach. Using this basic two-point, two-tangent algorithm, a **curve** -fitting technique for smoothing data with C **curves** was developed. Despite certain limitations, the C **curve** has resulted in the introduction of analog, digital, and hybrid C-**curve** hardware generators.

8/3,K/12 (Item 1 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16445056 MR 98g#65008
Computer aided geometric design.
Edited by Ravi P. Agarwal and Ruibin Qu. Neural Parallel Sci. Comput. 5 (1997), no. 1-2.
Contributors: Agarwal, Ravi P.; Qu, Ruibin
Publ: Dynamic Publishers, Inc., Atlanta, GA,
1997, pp. iii--iv and 1--296. ISSN: 1061-5369
Language: English
Computer aided geometric design
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (29 lines)
Reviewer: Editors

Contents: Ruibin Qu and Ravi P. Agarwal, Developments and applications of Gregory **surface** patches (1--36); Xuefu Wang and Fuhua Cheng, **Surface** design based on Hermite spline interpolation with tension control and optimal **twist vectors** (37--54); Helmut Pottmann, General offset **surfaces** (55--79); D. Blackmore, M. C. Leu, L. P. Wang [Li Ping Wang] and H...

...Bangert and Hartmut Prautzsch, Circle and sphere as rational splines (153--161); Kenji Ueda, Circular **Bezier** arcs as rational Pythagorean-hodograph **curves** (163--177); Joab R. Winkler, An ill-conditioned problem in computer aided geometric design (179--200); Marco D'Apuzzo and Lucia Maddalena, A parallel algorithm for parametric cubic $**B** $-**spline curves** interpolation (201--219); Ruibin Qu, Muhammad Sarfraz and Dingyuan Liu, A new approach to the improvement of **surface** triangulations using local algorithms (221--238); Qin-Zhong Ye, An $O(N)$ algorithm for computing...

...approach to quasi-interpolation methods (257--274); Ruibin Qu and Muhammad Sarfraz, Efficient method for **curve** interpolation with monotonicity preservation and shape control (275--288); Otto Roschel, Remarks on ${\rm GC}\sp 1$-continuity of adjacent rational **Bezier** patches (289--296).
\{The paper by Wang and Cheng is being reviewed individually.\} ...

8/3,K/13 (Item 2 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16357977 MR 97j#65032
Gregory-type patches bounded by low degree integral curves for $G\sp 2$ continuity.
In memory of John Gregory.
Miura, Kenjiro Takai
Wang, Kuo-King (Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, New York, 14853)
Corporate Source Codes: 1-CRNL-A
Comput. Aided Geom. Design
Computer Aided Geometric Design, 1996, 13, no. 9, 793--810. ISSN: 0167-8396 CODEN: CAGDEX
Language: English Summary Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: MEDIUM (14 lines)
Reviewer: Summary

Summary: ``$G\sp 2$ continuity of free-form **surfaces** is sometimes very important in engineering applications. The conditions for $G\sp 2$ continuity to connect two **Bezier** patches have been studied and methods have been developed to ensure it. However, they impose some restrictions on

the shapes of patches of the **Bezier** -patch formulation. The Gregory patch is a kind of free-form **surface** patch which is extended from the **Bezier** patch so that the four first **derivatives** on its boundary **curves** can be specified without restrictions of the compatibility condition. Several types of Gregory patches have been developed for integral, rational, and **NURBS** boundary **curves** . In this paper, we propose some integral boundary Gregory-type patches bounded by cubic and quartic **curves** for $G\sp 2$ continuity.''
\{For the entire collection see MR 97i:65009.\} ...

8/3,K/14 (Item 3 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16314520 MR 97e#65025
NURBS boundary $C\sp 2$ Gregory patch.
Computer aided geometric design (Penang, 1994).
Miura, Kenjiro T.
Chiyokura, Hiroaki (Keio University, Fujisawa 252, Kanagawa, Japan)
Corporate Source Codes: J-KEIOEV
Ann. Numer. Math.
Annals of Numerical Mathematics, 1996, 3, no. 1-4, 267--283.
ISSN: 1021-2655
Language: English Summary Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: MEDIUM (18 lines)
Reviewer: Summary

Summary: ``A new type of free-form **surface** patch called **NURBS** boundary $C\sp 2$ Gregory patch (${\rm NBC}\sp 2{\rm G}$ patch) is introduced. An ${\rm NBC}\sp 2{\rm G}$ patch, whose boundary is defined by four **NURBS** **curves** , is an extension of both the $C\sp 2$ Gregory patch developed by Miura and Wang, which gives users the capability of designing curvature-continuous ($G\sp 2$ continuous) **surfaces** with reasonable flexibilities, and also that of **NURBS** boundary Gregory patch proposed by Sone et al., which is surrounded by **NURBS** **curves** and can be interpolated by specifications of its cross-boundary first **derivatives** . This new type of **surface** patch inherits advantages of both the $C\sp 2$ Gregory patch and the **NURBS** boundary Gregory patch. It is defined so as to connect it with a rational **Bezier** patch and with a rational boundary $C\sp 2$ Gregory patch with $G\sp 2$ continuity when its boundary can be expressed as rational **Bezier** **curves** . Derivation, properties, and examples of the new type of **surface** patch are also presented.''
\{For the entire collection see MR 97a:65002\}. ...

8/3,K/15 (Item 4 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16117029 MR 95g#65028
Geometric modelling for numerically controlled machining.
Marciniak, Krzysztof (Department of Precision Mechanics, Technical University of Warsaw, 00-665 Warsaw, Poland)
Corporate Source Codes: PL-WASWT-PR
Publ: The Clarendon Press, Oxford University Press, New York, 1991, x+245 pp. ISBN: 0-19-856353-1
Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (44 lines)
Reviewer: Preface

...introduction to NC programming problems.
``The first part focuses on the geometric modelling of sculptured **surfaces** . It brings together and applies analytic geometry, **vector** calculus, and computation methods essential in NC programming and NC software development. First, differential properties of **curves** are

introduced. Next, piecewise polynomial and rational **curves** are described. **Bezier** , Hermite, and **B -spline** bases are used here. In the chapters that follow, **surface** handling techniques are presented. Tensor products and Coons patches are described. For completeness, triangular and...

8/3,K/16 (Item 5 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16109675 MR 95f#65009
Curves and surfaces in geometric design.
Proceedings of the Second International Conference on Curves and Surfaces held in Chamonix-Mont-Blanc, June 10--16, 1993. Edited by Pierre-Jean Laurent, Alain le Mehaute and Larry L. Schumaker.
Contributors: Laurent, Pierre-Jean; le Mehaute, Alain; Schumaker, Larry L.
Publ: A K Peters, Ltd., Wellesley, MA,
1994, xvi+490 pp. ISBN: 1-56881-039-3
Language: English
Curves and surfaces in geometric design; Conference: Curves and Surfaces,; Chamonix-Mont-Blanc, 2nd International 1993
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (98 lines)
Reviewer: Editors

...34); J. L. Bauchat, On polynomial functions defining the geometric continuity between two (${\rm SBR}$) **surfaces** (35--42); E. Bertin and J.-M. Chassery, A 3D generalized Voronoi diagram for...

...set of polyhedra (43--50); G.-P. Bonneau and H. Hagen, Variational design of rational **Bezier curves** and **surfaces** (51--58); C. Brezinski, An introduction to Pade approximations (59--65); Hermann G. Burchard, Discrete **curves** and curvature constraints (67--74); J.-C. Canonne, A necessary and sufficient condition for the $C\sp k$ continuity of triangular rational **surfaces** (75--82).
J. M. Carnicer and J. M. Pena, Monotonocity preserving representations (83--90); Paul...

...and open problems (121--130); M. Eck and J. Hadenfeld, A stepwise algorithm for converting $**B** $-**splines** (131--138); Eberhard F. Eisele, Best constrained approximations of planar **curves** by **Bezier curves** (139--146); G. Farin, Projective blossoms and **derivatives** (147--152); J.-C. Fiorot and Th. Gensane, Characterizations of the set of rational parametric **curves** with rational offsets (153--160); J.-C. Fiorot and P. Jeannin, A necessary and sufficient condition for joining B-rational **curves** with geometric continuity $G\sp 3$ (161--168).
I. Gansca, Gh. Coman and L. Tambulea, Generalizations of **Bezier curves** and **surfaces** (169--176); M. Gasca and J. M. Pena, Corner cutting algorithms and totally positive matrices...

...Curvature of rational quadratic splines (201--208); Raul Gormaz, B-spline knot-line elimination and **Bezier** continuity conditions (209--216); R. J. Goult, Applications and constrained polynomials to **curve** and **surface** approximation (217--224); J. Gravesen, Semi-regular B-spline **surfaces** : generalized lofting by B-splines (225--232); Christoph Henninger and Karl Scherer, On best convex interpolation of **curves** (233--240).
Josef Hoschek and Franz-Josef Schneider, Approximate conversion and data compression of integral...

...from discrete points with NURBS (319--326).
Dinesh Manocha, Amitabh Varshney and Hans Weber, Evaluating **surface** intersections in lower dimensions (327--334); A. Neubauer, The iterative solution of a nonlinear inverse...

...maps as nonlinear roots of the identity (369--376); Helmut Pottmann, Applications of the dual **Bezier** representation of rational **curves** and

surfaces (377--384); J. F. Rameau, Bifurcation phenomena in a tool path computation (385--392); John...

...Roulier and Bruce Piper, Interpolation with an arc length constraint (393--400); Jean-Christophe Roux, **Curve** reconstruction (401--408).
G. Sapiro and A. M. Bruckstein, The ubiquitous ellipse (409--418); Thomas...

8/3,K/17 (Item 6 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16081336 MR 95c#65023
Using general polar values as control points for polynomial curves.
Duchaineau, Mark A. (Department of Computer Science, University of California, Davis, California, 95616)
Corporate Source Codes: 1-CAD-C
Comput. Aided Geom. Design
Computer Aided Geometric Design, 1994, 11, no. 4, 411--423. ISSN: 0167-8396 CODEN: CAGDEX
Language: English Summary Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: MEDIUM (14 lines)
Reviewer: Summary

Summary: ``Blossoming has proven to be a useful technique for understanding and generalizing polynomial **curves** through the use of the polar form. In this paper we show that general polar values may be used to control polynomial **curves** when a related matrix is invertible. The inverse matrix provides a useful translation from these general blossom control points to well-known ones such as those of **Bezier** . The special case in which the polar form can be evaluated through pairwise affine combinations...
...the blossom control points to be chosen in a manner akin to choosing the knot **vector** of a B-**spline** segment. The number of free parameters for specifying the blossom control points of polynomial **curves** is increased significantly over the B-**spline** case.'' ...

8/3,K/18 (Item 7 from file: 239)
DIALOG(R)File 239:Mathsci(R)

15993536 MR 94e#65007
Geometric modelling.
Edited by G. Farin, H. Hagen and H. Noltemeier in cooperation with W. Knodel.
Contributors: Farin, G.; Hagen, H.; Noltemeier, H.; Knodel, W.
Publ: Springer-Verlag, Vienna,
1993, vi+316 pp. ISBN: 3-211-82399-9
Series: Computing Supplementum, 8.
Language: English
Geometric modelling
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (37 lines)
Reviewer: Editors

Contents: Robert E. Barnhill, Gerald E. Farin and Qian Chen, Constant-radius blending of parametric **surfaces** (1--20); M. I. G. Bloor and M. J. Wilson [Michael John Wilson], Functionality in...

...with an object-oriented approach (43--57); W. L. F. Degen, Best approximations of parametric **curves** by splines (59--73); P. Brunet, I. Navazo and A. Vinacua, A modelling scheme for the approximate representation of closed **surfaces** (75--90); T. A. Foley, S. Dayanand and R. Santhanam, Cross boundary **derivatives** for transfinite triangular patches (91--100); T. N. T. Goodman, B. H. Ong and K. Unsworth,

Reconstruction of $C\sp 1$ closed **surfaces** with branching (101--115); J. A. Gregory, V. K. H. Lau and J. M. Hahn...

...polygonal patches (117--132); H. Hagen and G.-P. Bonneau, Variational design of smooth rational **Bezier -surfaces** (133--138); B. Hamann, Curvature approximation for triangulated **surfaces** (139--153); D. Lasser, Composition of tensor product **Bezier** representations (155--172); P. E. Koch and T. Lyche, Interpolation with exponential **$B $-splines** in tension (173--190); G. M. Nielson, A characterization of an affine invariant triangulation (191...

...with scattered data interpolation methods (267--281); W. Schwarz, $C\sp 1$-smoothing of multipatch **Bezier surfaces** (283--289); P. Wassum, Geometric continuity between adjacent rational **Bezier surface** patches (291--316).
{Some of the papers are being reviewed individually.} ...

8/3,K/19 (Item 8 from file: 239)
DIALOG(R)File 239:Mathsci(R)

15927772 MR 93j#65025
Courbes splines rationnelles.
Rational spline curves
Applications a la CAO. [Applications to CAD]
Fiorot, J.-C. (Departement de Mathematiques, Universite de Valenciennes et du Hainaut-Cambresis, 59326 Valenciennes, France)
Jeannin, P. (UFR de Mathematiques Pures et Appliquees, Universite de Lille I, 59655 Villeneuve d'Ascq, France)
Corporate Source Codes: F-VALN; F-LILL
Publ: Masson, Paris,
1992, 275 pp. ISBN: 2-225-82825-3
Series: Recherches en Mathematiques Appliquees [Research in Applied Mathematics], 24.
Language: French
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (36 lines)
Reviewer: Quak, Ewald (1-TXAM)

...monograph, the authors give an account of their approach for the treatment of rational spline **curves** , generalizing the concept of **nonuniform rational $B $-splines (nurbs)** in order to be able to represent wider classes of **curves** not covered by **nurbs** . Using tools from projective geometry, the key concept for the authors' considerations turns out to be the notion of so-called massic **vectors** and, consequently, spline **curves** determined by polygons of massic **vectors** are at the center of the investigations.
The book is structured as follows, with each...

...containing fully worked examples for the main topics. Chapter 1 provides the general framework on **Bezier curves** and the de Casteljau algorithm. The concept of massic vectors is introduced and then used to define so-called B-rational **curves** by considering **Bezier curves** for polygons of massic vectors. Properties of these **curves** are described. In Chapter 2, necessary concepts from spline theory are reviewed such as the definition of polynomial spline functions and **curves** , the recursion algorithm and the conditions for two polynomial **curves** to meet with a certain order of smoothness. Chapter 3 is devoted to the use...

...generalized version of Marsden's identity in order to write Bernstein polynomials in terms of **$B $-splines** and thus determine the spline polygon for a piecewise **Bezier curve** from the original **Bezier** polygons. Chapter 4 deals with the conditions for two rational **curves** to meet with a certain smoothness. In Chapter 5, N-rational **curves** are introduced, based on **$B $-spline curves** using polygons of massic **vectors** . It is shown that any rational spline **curve** can be written as an N-rational **curve** . The analogues of the spline recursion, insertion and

subdivision algorithms are discussed. The approximation of B-rational **curves** by **Bezier** or B-rational **curves** with fewer control **vectors** is treated in Chapter 6. In Chapter 7, the smoothness conditions for two adjacent B-rational **curves** in terms of their massic **vectors** are investigated. Finally, in Chapter 8, B. Sucher describes a package of Mathematica routines which...

8/3,K/20 (Item 9 from file: 239)
DIALOG(R)File 239:Mathsci(R)

15876203 MR 93d#65022
Mathematical methods in computer aided geometric design. II.
Papers from the International Conference on Curves, Surfaces, CAGD, and Image Processing held in Biri, June 20--25, 1991. Edited by Tom Lyche and Larry L. Schumaker.
Contributors: Lyche, Tom; Schumaker, Larry L.
Publ: Academic Press, Inc., Boston, MA,
1992, xviii+626 pp. ISBN: 0-12-460510-9
Language: English
Mathematical methods in computer aided geometric design,; Conference: Curves, Surfaces, CAGD, and Image Processing,; Biri, 1991 2 International
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (79 lines)
Reviewer: Editors

...111--133); M. Daehlen and T. Lyche, Decomposition of splines (135--160).

Marc Daniel, A **curve** intersection algorithm with processing of singular cases: introduction of a clipping technique (161--170); W. L. F. Degen, Best approximations of parametric **curves** by splines (171--184); Tony DeRose and Stephen Mann, An approximately $G\sp 1$ cubic **surface** interpolant (185--196); Wen-Hui Du and Francis J. M. Schmitt, On the $G\sp 2$ continuity of piecewise parametric **surfaces** (197--207); Nira Dyn and David Levin, Stationary and nonstationary binary subdivision schemes (209--216); Matthias Eck, MQ-**curves** are **curves** in tension (217--228); G. Elber and E. Cohen [Elaine Cohen], Offset approximation improvement by control point perturbation (229--237); Rida T. Farouki and Jean-Claude A. Chastang, **Curves** and **surfaces** in geometrical optics (239--260); Michael S. Floater, Evaluation and properties of the **derivative** of a **NURBS** **curve** (261--274); Thomas A. Foley and Karsten Opitz, Hybrid cubic **Bezier** triangle patches (275--286).

Lars A. Froyland, Arne Laksa and Jan Pajchel, Modelling geological structures...

...P. K. Yuen, An arbitrary mesh network scheme using rational splines (321--329); Josef Hoschek, **Bezier** **curves** and **surface** patches on quadrics (331--342); M. K. Ismail, Monotonicity preserving interpolation using $C\sp 2$ rational cubic **Bezier** **curves** (343--350); Per Erik Koch, Minimization of interpolating spline **curves** with bounded derivatives (351--358); J. Kozak [Jernej Kozak] and M. Lokar, On piecewise quadratic...

...and generic triangulations (401--412); Marie-Laurence Mazure, Geometric contact of order p between two **surfaces** (413--418); B. H. Ong and K. Unsworth, On nonparametric constrained interpolation (419--430); R...

...and R. Goldman, Tensor product slices (431--440); A. R. M. Piah, Construction of smooth **surfaces** by piecewise tensor product polynomials (441--455); Mike Pratt, The virtues of cyclides in CAGD (457--473); Hartmut Prautzsch and Wilfried Trump, Simple **surfaces** have no simple $C\sp 1$ parametrization (475--480); Christophe Rabut, Some tools for quasi-interpolation on cardinal grids (481--496); Paul Sablonniere, Discrete **Bezier** **curves** and **surfaces** (497--515); R. Schaback, Rational geometric **curve** interpolation (517--535).

G. Schmeltz, Curvature properties of parametric triangular **Bezier** patches (537--548); Thomas W. Sederberg and David B. Buehler, Offsets of polynomial **Bezier** **curves** : Hermite approximation with error bounds

(549--558); H.-P. Seidel, Representing piecewise polynomials as linear...

...Discrete convolution schemes (585--596); Kenji Ueda, A method for removing the singularities from Gregory **surfaces** (597--606); N. Weyrich, Bivariate spline approximation by penalized least squares (607--614); Rainer Zeifang...

8/3,K/21 (Item 10 from file: 239)
DIALOG(R)File 239:Mathsci(R)

03359389 MR 91k#65033
Approximation and geometric modeling with simplex B-splines associated with irregular triangles.
Auerbach, S. (Mathematisches Institut, Rheinische Friedrich-Wilhelms-Universitat Bonn, W-5300 Bonn, Federal Republic of Germany)
Gmelig Meyling, R. H. J. (Koninklijke/Shell Exploration and Production Laboratory, 2280 AB Rijswijk, The Netherlands)
Neamtu, M. (Department of Applied Mathematics, Universiteit Twente, 7500 AE Enschede, The Netherlands)
Schaeben, H. (Mathematisches Institut, Rheinische Friedrich-Wilhelms-Universitat Bonn, W-5300 Bonn, Federal Republic of Germany)
Corporate Source Codes: D-BONN; NL-KOSH; NL-TWEN-A; D-BONN
Comput. Aided Geom. Design
Computer Aided Geometric Design, 1991, 8, no. 1, 67--87. ISSN: 0167-8396 CODEN: CAGDEX
Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (35 lines)
Reviewer: Summary
...which give rise to six configurations of five knots defining six linearly independent bivariate quadratic $B $-**splines** supported on the convex hull of the corresponding five knots. If we consider the vertices of the triangulation as threefold knots, the bivariate quadratic $B $-**splines** turn into the well-known bivariate quadratic Bernstein-**Bezier** -form polynomials on triangles. Thus we might be led to think of $B $-**splines** as of smoothed versions of Bernstein-**Bezier** polynomials with respect to the entire domain. From the degenerate Bernstein-**Bezier** situation we deduce rules for locating the additional points associated with each vertex to establish...

...that allow the modeling of discontinuities of the function itself or any of its directional **derivatives** . We find that four collinear knots out of the set of five defining an individual quadratic $B $-**spline** generate a discontinuity in the **surface** along the line they constitute, and that analogously three collinear knots generate a discontinuity in a first **derivative** .
``Finally, the coefficients of the linear combinations of normalized simplicial B-splines are visualized as...

8/3,K/22 (Item 11 from file: 239)
DIALOG(R)File 239:Mathsci(R)

03218547 MR 91d#65021
Computational geometry in China: a survey.
The mathematics of surfaces, III (Oxford, 1989)
Wang, C. Y. (Department of Mathematics, Shandong University, Jinan, Shandong, Peoples Republic of China)
Corporate Source Codes: PRC-SHAN
1989,
Oxford Univ. Press, New York,; 207--226,,
Series: Inst. Math. Appl. Conf. Ser. New Ser., 23,
Language: English

Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (26 lines)
Reviewer: Jiang, Shou Shan (Xi'an)

...the properties of curves and surfaces. It consists of two parts. In the part on **curves** , first a simple and practical fairing criterion of **curves** is presented. The methods of the classification of cubic **curves** can be used not only to analyse the **curves** but also to control the **curves** when they are constructed. The classification methods adopted are used to give the relation between the lengths of the tangent **vectors** of a cubic **curve** segment at its two end points and its inflexion point, cusp and loop. Some important properties of **Bezier** **curves** and B-**splines** , such as the convexity and variation-diminishing properties, the approximation properties and the envelopes of **Bezier** **curves** , are discussed. A taut spline is an interpolation **curve** which inherits the virtues of a B-**spline** while removing unexpected inflexion points. Finally, a fast and efficient method for generating conic **curves** is provided.

In the part on **surfaces** , an important result is the proofs of the convexity property of triangular B-B patches...

...patches. Another interesting result is the G^n necessary and sufficient conditions between adjacent **Bezier** patches. The recurrence algorithms of generating B-spline basic functions in three dimensions are efficient...

8/3,K/23 (Item 12 from file: 239)
DIALOG(R)File 239:Mathsci(R)

03202124 MR 90m#65039
Rational curves and surfaces.
Mathematical methods in computer aided geometric design (Oslo, 1988)
Farin, Gerald (Department of Computer Science, Arizona State University, Tempe, Arizona, 85287)
Corporate Source Codes: 1-AZS-C
1989,
Academic Press, Boston, MA,; 215--238,,
Language: English
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (26 lines)
Reviewer: Jiang, Shou Shan (Braunschweig)

Rational **curves** and **surfaces** are considered to be the most promising **curves** and **surface** forms in the CAD/CAM industry and in graphics. The main reason for this is that the rational **curves** and **surfaces** can present exactly conics and **surfaces** of revolution. Besides, their weights can be used to control the shapes of the **curves** and the **surfaces** . However, some open questions remain for them. This article is a survey and a tutorial on the theory and use of rational **Bezier** **curves** and rational B-**spline** **curves** as well as the corresponding **surface** schemes. It introduces the expressions of conics as rational quadratics, their **derivatives** , their classification, and conic splines. Then, rational **Bezier** **curves** are discussed, including their **derivatives** , reparameterization, degree elevation, de Casteljau algorithm, the influences of the weights on the shapes of the **curves** and functional rational **Bezier** **curves** . Similarly, B-**spline** **curves** and **surfaces** are discussed. Finally, some results about quadratic **surfaces** are presented. Several open questions are pointed out, such as algorithms, reparameterization of rational B-**spline** **curves** and **surfaces** , the representation of quadric **surfaces** , general G^k conditions or even general C^k conditions, etc. In summary: it does not seem to be a viable option to introduce **NURBS** (**nonuniform** **rational** B-**splines**) just in order to be able to handle conic sections and **surfaces** of revolution ``exactly''. The overhead that is thus created does not justify the alleged payoff. It seems therefore that the present popularity of **NURBS** is more of a trend than a real necessity.

{For the entire collection see MR...

8/3,K/24 (Item 13 from file: 239)
DIALOG(R)File 239:Mathsci(R)

02645857 MR 83g#65017
A characteristic analysis of the variation diminishing transformations.
Hu, Ying Sheng
Hu, Shu Xian
Acta Math. Appl. Sinica
Acta Mathematicae Applicatae Sinica. Yingyong Shuxue Xuebao, 1980, 3, no. 2, 106--121.
Language: Chinese
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: MEDIUM (24 lines)
Reviewer: Authors' introduction

...sub}i)){sub}(i=0){sup}n of function values, either with or without boundary **derivative** conditions. We also prove that such approximations have the desirable geometric property of not increasing...

...variation diminishing approximations. ``Since the basis functions for Bernstein approximation are a special case of **B -splines** , and Bernstein polynomial approximation is a special case of variation diminishing spline approximation, the results of this article generalize the (parametric polynomial form of the) **Bezier curve** method.'' ...